Pit and Quarry

Published Every Other Wednesday for Producers and Manufacturers of Sand, Gravel, Stone, Cement, Gypsum, Lime and Other Non-Metallic Minerals.

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Pit and Quarry

Vol. 16 CHICAGO, ILL., JUNE 6, 1928 No. 5

LIME MANUFACTURERS DISCUSS PROBLEMS

LIME manufacturers representing a substantial portion of the entire lime industry gathered in New York City on May 23 and 24 at the Belmont Hotel for the annual convention of the National Lime Association. The sessions were opened at ten o'clock on Wednesday morning by J. F. Pollock, chairman of the executive board. From the start of the convention to its close on Thursday afternoon splendid attendance with much discussion characterized the sessions.

The character of the convention can best be described as a recital of the difficulties and troubles within the industry and a discussion of remedies for the situation. The recital of the trouble started with the report of G. B. Arthur, general manager. The limited financial situation as brought out by Mr. Arthur in his report accounted for his limited activity during the past year and it was apparent that funds would be absolutely essential to any aggressive or constructive program by a national organization. Mr. Arthur presented his resignation to the association at this session.

A committee on organization and another on resolution was appointed. The committee on organization was charged with the task of presenting recommendations concerning the conduct of the association for the next issue. Their report was presented on Thursday afternoon and is published with this article.

John A. Grimes, representing the Treasury Department, invited the association to cooperate with the government in determining a standard depreciation schedule for lime plants and equipment in his talk outlining a proposed study of the lime business to simplify income tax reporting. He urged the values of cost studies throughout the industry and succeeded in impressing those present with the need for a better understanding of production costs, depreciation and depletion.

Mr. Grimes compared the lime business made up of several sections with the United States and its separate state units emphasizing the need for a national head. He ventured the opinion that lime manufacturers were actually kidding themselves on the matter of costs and were in reality giving away capital assets. He recommended the stabilization of cost accounts and the adoption of a uniform cost system by the National Lime Association for the industry.

S. W. Stauffer

Francis H. Sisson, vice-president of the Guaranty Trust Company of New York, addressed the convention at luncheon on Wednesday with an analytical review of the business situation as a whole. There was little in the general business situation to account for the present condition in the lime industry.

A Round Table Discussion was held on Wednesday afternoon with S. W. Stauffer, Chairman of the Convention, presiding. Many lime manufacturers spoke informally of conditions in the lime business particularly as concerned their respective district. The entire recital was one of effect with little talk of the cause and remedy. The reports did not even indicate a disrupted situation but in many instances they did show a falling off in business and a demoralized market situation.

Excessive plant capacity, lack of confidence,

competition of competitive materials, too much salesmanship and lack of cooperation were the significant factors mentioned. The Round Table Discussion proved to be a real experience meeting and it was decided to hold another session on Thursday morning.

A dinner with entertainment was furnished by the Valve Bag Company on Wednesday evening. B. A. Ford, formerly secretary and general manager for the Association and now sales manager of the Valve Bag Company, acted as host.

Thursday morning the Round Table Discussion was resumed with S. W. Stauffer presiding. The discussion of the present situation continued with some commenting upon remedies. Mr. G. B. Wood of the Rockland Rockport Lime Company, explained that manufacturers in New England did get together and had demonstrated that cooperative effort helped. Mr. Cheney of the Cheney Lime Company put his finger on one pertinent condition when he charged the salesman with a large share of the responsibility for present conditions. As he explained, the salesman is interested almost entirely in orders and, in general, salesmen are determined to get the order one way or another.

Ray Noll of Whiterock Quarries spoke for a uniform cash discount. Mr. Gager of the Gager Lime and Manufacturing Company expressed his approval of a uniform cost accounting system and volunteered his figures and system for study. Charles Warner called attention to the Czar in industry and suggested the application to the lime industry. Others suggested closer cooperation, decreases in plant capacity and careful analysis of sales distribution.

Charles F. Abbot, executive director, American Institute of Steel Construction, stirred the convention with his luncheon address "The Basic Problem of Industrial Organization" or "A Million Times Nothing." This address should be read carefully. It is published in full on page 59 of this issue. What Mr. Abbott has done for steel construction might be done for lime. What he has done is far more than must be done for the lime business.

The closing business session was held on Thursday afternoon and presided over by J. F. Pollock. The Committee on organization reported and new officers and directors were elected. An executive committee was elected consisting of J. L. Durnell, J. M. Deely, A. R. Mack, J. M. Gager and H. B. Mathews. Ralph Wilton was elected treasurer. The new directors were also elected as shown.

The Committee on Organization consisting of B. L. McNulty, G. B. Wood, J. L. Durnell, Reed Bye and J. M. Childs, made the following recommendations, based on their unanimous opinion that the Association must proceed on a broader and more constructive basis or else cease to exist.

Commencing July 1, 1928, the dues for the next fiscal year shall be two cents (2c) per ton for burned lime products sold during the calendar year 1927.

That all outstanding certificates of indebtedness be paid in full at maturity.

That necessary steps be taken immediately to dispose of the present lease on the offices at Washington and that less expensive space be obtained to care for the smaller organization. That the surplus furniture and office equipment be sold, but that the laboratory equipment be retained for future use.

That an Executive Committee of five (5) be elected by the Committee, which shall assume the active management of the Association. This Executive Committee to elect its own Chairman. The Directors shall meet with the Executive Committee at least twice a year, or more often, at the discretion of the Executive Committee.

That a capable business man (preferably not in the industry) be employed as General Manager to direct the activities of the Association, but whose practical duty shall be to assist in the organization of the membership into district groups, and to render real service to individuals and groups to more actively promote the lime industry in the manner best suited to various sections as groups are organized.

That a headquarters organization be maintained which will be capable of representing the industry properly and intelligently in its contact with the public.

From the funds available technical research will not be possible in the Association's budget but should be carried on in commercial laboratories from special funds appropriated by group organizations.

That the invitation of the Treasury Department to appoint a committee of operating men to cooperate with government agencies be accepted, and this committee shall establish a standard depreciation schedule for plants and equipment, and from this basis vigorously pursue lines of study that will help to establish true cost records throughout the industry.

Directors

The following were elected to the Board of Directors:

DISTRICT 1	
Howard D. Brewer	Brewer & Company Worcester, Mass.
A. V. A. Felten	New England Lime Co. Pittsfield, Mass.
DISTRICT 2	
S. W. Stauffer	J. E. Baker Co. York, Pa.
Reed C. Bye	Charles Warner Co. Wilmington, Del.
DISTRICT 3	
Ray Noll	White Rock Quarries Bellefonte, Pa.

DISTRICT 4 W. E. Carson	Riverton Lime Co. Riverton, Virginia.
DISTRICT 5 G. J. Whelan	Kelley Island Lime & Transport Co. *Leader-News* Building Cleveland, Ohio.
DISTRICT 6 G. J. Nicholson	Manistique Lime & Stone Co. Manistique, Michigan.
DISTRICT 7 B. L. McNulty	Marblehead Lime Co. 160 N. La Salle St. Chicago, Ill.
E. S. Healey	Glencoe Lime & Cement Co. 915 Olive Street St. Louis, Mo.
DISTRICT 8 R. C. Brown	Wisconsin Lime Manufacturers' Ass'n. Oshkosh, Wisconsin.
DISTRICT 9 Henry LaLiberte	Cutler-Magner Co. 1114 Fidelity Bldg. Duluth, Minn.
DISTRICT 11 J. M. Gager	Gager Lime & Mfg. Co. Provident Bldg. Chattanooga, Tenn.
DISTRICT 12 J. F. Pollock	Ash Grove Lime & Portland Cement Co. Grand Avenue Temple Kansas City, Missouri.
DISTRICT 13 H. Dittlinger	Dittlinger Lime Co. New Braunfels, Texas.
DISTRICT 14 J. S. McMillin	Roche Harbor Lime & Cement Co. Roche Harbor, Wash.
DISTRICT 15 C. M. Cadman	United States Lime Products Corp., successor to Pacific Lime & Plaster Co. 58 Sutter Street San Francisco, Calif.

The convention adjourned and the new directors with the executive committee held its first official meeting following adjournment of the convention on Thursday afternoon.

A manufacturer exhibit was not held nor planned but the McGann Manufacturing Company displayed a very attractive model of their Schulthess plant in one of the hotel rooms. The interest displayed in their model indicates that a machinery exhibit could be held with benefit and profit.

Registration

F. W. Barhoff, Jr., Allyndale Lime Co.
R. C. Brown, Western Lime & Cement Co.
H. V. Brewer, Brewer Co.
C. C. Bye, Chas. Warner Co.
Reed C. Bye, Chas. Warner Co.
Callan Beatteay, Restiqouche Co., Ltd.
C. A. Campbell, Campbell Stone Co.
J. M. Chiles, Austin White Lime Co.
Bolton L. Corson, G. & W. H. Corson Co.
S. E. Cole, Pit and Quarry.
Walton N. Cable, Walton N. Cable Co.
Philip L. Corson, G. & W. H. Corson Co.
F. C. Cheney, Cheney Lime Co.
F. W. Cramer, York Valley Lime & Stone Co.
E. L. Davis, Raymond Bros Imp. Polv. Co.
John G. Drummond, Indiana Limestone Co.
John M. Deeley, Lee Lime Corp.
John F. Deely, Lee Lime Corp.
S. C. Deitzler, Annville Lime Co.
J. L. Durnall, Van Sciver Corp.
Fred A. Daboll, Miller Lime Products Corp.
H. Dittlinger, Dittlinger Lime Co.
A. V. A. Felton, New England Lime Co.
William Flaherty, Hoosac Valley Lime Co., Inc.
Burton A. Ford, Valve Bag Co.
V. M. Frey, Consulting Engineer.
John F. Gruber, North American Cement Corp.
J. W. Grimes, B. & C. Lime & Stone Co.
J. A. Grimes, Treasury Department.
J. M. Gager, Gager Lime Mfg. Co.
Burton K. Harris, Proprietor.
H. E. Hopkins, Cement Mill & Quarry.
K. E. Hothorn, Synthet. Nitro. Products Co.
W. E. Healey, Rockland & Rockport Lime Co.
E. S. Healey, Glencoe Lime & Cement Co.
J. P. Hennesey, Annville Lime Co.
Eugene Holland, Universal Gypsum Co.
W. R. Hazzard, Chas. Warner Co.
R. F. Hogan, Chas. Warner Co.
L. H. Hartman, Valve Bag Co.
Carl H. Hartman, Valve Bag Co.
S. B. Kanowitz, Raymond Bros. Pulv. Co.
H. G. Kimble, Kent Mill Co.
Geo. Legore, Legore Lime Co.
H. W. Munday, Pit and Quarry.
Geo. Martin, Hoosac Valley Lime Co.
C. L. Montgomery, Vermarco Lime Co.
A. B. Mack, Kelley Island Lime & Trnsp. Co.
R. B. Menke, F. W. Menke Stone and Lime Co.
Harry B. Mathews, Mississippi Lime Co.
Bernard L. McNulty, Marble Head Lime Co.
K. M. Nahikian, Brewer & Co., Inc.
John W. Norris, Rose Point Stone & Lime Co.
Ray C. Noll, Whiterock Quarries.
H. E. Naust, Steacy & Wilton Co.
E. L. Osborne, Kelley Island Lime & Trans. Co.
G. J. Purnell, American Lime & Stone Co.
Lowell Palmer,
E. C. Powers, The Marble Cliff Quarries Co.

E. M. Proctor, Bemis Bro. Bag Co.
John F. Pollock, Ash Grove Lime.
B. H. Rice, John D. Owens & Sons.
Nathan C. Rockwood, Rock Products.
Marshall E. Reed, North American Cement Corp.
Russell Rarey, Marble Cliff Quarries.
S. W. Stauffer, J. E. Baker Co.
Ralph C. Sullivan, Rock Products.
W. G. Stromquist, Universal Gypsum Co.
S. M. Shallcross, American Lime & Stone Co.
Francis A. Westbrook, Pit and Quarry.
Charles Warner, Charles Warner Co.
Irving Warner, Charles Warner Co.
Gordon Willis, Hunkins Willis Lime & Cement Co.
Geo. T. Weigart, Batesville White Lime Co.
R. P. Wilton, Steacy & Wilton Co.
N. S. Meyers, Limestone Products Co.

National Highway Legislation

Five major pieces of legislation, of interest to the motorists of the country, involving $239,200,000, were passed by the 70th Congress, which adjourned recently, according to the legislative department of the American Motorists' Association. Four bills, likewise of interest to the motorists, were left pending before various committees. One bill, viz., the Oddie-Colton bill, involving $10,500,000 for the construction of the gaps in the Federal-aid highway program, failed by virtue of the President's veto after being passed by the Senate and House.

The five measures which passed were the $165,000,000 Federal-aid bill; the $66,000,000 automobile excise tax elimination bill; the $4,200,000 appropriation for the Mount Vernon Memorial Highway; the $4,000,000 flood relief measure for reconstruction of Federal highways in the States of Vermont, Kentucky and New Hampshire, and the Oddie amendment to the Federal Highway Act. The amendment marks the first step that the Federal Government has taken in beautification of the Federal highway system. It authorizes the planting of trees along the Federal-aid route, and provides that the Federal Government shall share with the states on an equal basis, the original cost of tree planting and maintenance.

The four measures which are now pending before various committees, and which will be considered further at the December session include the Browne-Watson bill, which authorizes a special highway building fund of $407,341,000 and which, it is estimated, will speed up five times highway construction in the United States. The second is the Du Pont Rathbone bill, which provides for the construction of a 500 foot highway across the United States, to be financed by the leasing of business sites, throughout its 3,000 mile length. Federal regulation of interstate motor bus traffic, recommended by the Interstate Commerce Commission, and endorsed by more than a score of national motorists and commercial organizations, failed, but will be taken up early in December, according to Congressman James S. Parker, author of the bill. The fourth measure, which did not reach a final vote, was a $1,000,000 appropriation for the widening of the National Defense Highway, linking the Nation's Capital with the Naval Academy at Annapolis.

In addition to the bills passed, three joint resolutions were adopted, the first authorizing a $15,000 appropriation to send American delegates to the Second Pan-American Congress on Highways at Rio de Janeiro; the second authorizing $25,000 expenditure for the Federal Government to entertain delegates to the Permanent International Association of Road Congresses, which will hold its sixth session in the United States in 1930, and the third authorizes the appointment of a commission to study the construction of a North-American Highway traversing North, South and Central Americas.

"From the motorist's viewpoint, the legislation passed by the last Congress was most satisfactory," according to J. Borton Weeks, president of the American Motorists' Association. "The continuation for two years of the Federal-aid program and the elimination of the 3 per cent automotive excise tax were unanimously endorsed by the motorists. The Oddie amendment, authorizing an expenditure out of Federal funds for tree planting along the Federal highway system, marks the first step in the beautification of our highway system, which will bring pleasure to the millions of motorists for all time to come," President Weeks points out.

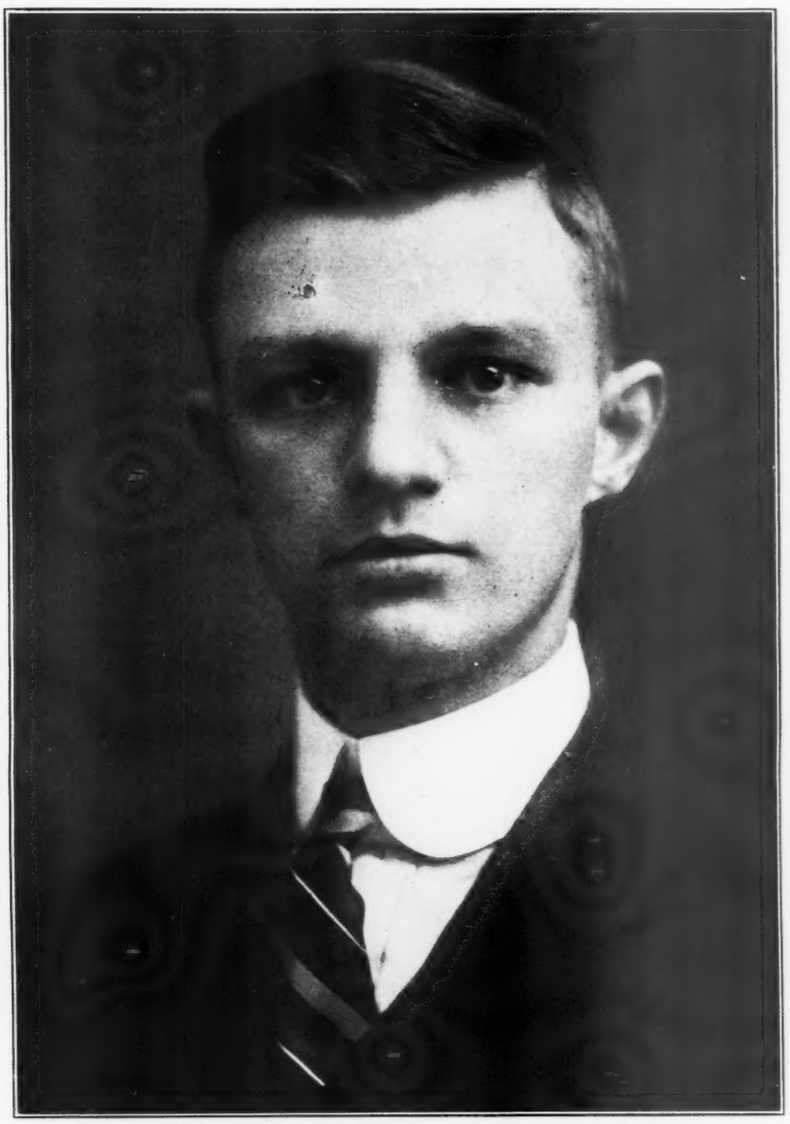
Figures compiled by the association show that on July 1 there will be a total of $241,115,000 of Federal funds available for the Federal-aid highway program. Of this sum $128,000,000 is available for projects now under construction; $29,000,000 being available for projects not yet begun, but which have been approved, and $84,115,000 being available for new construction projects.

Composition of Cement

Cement hydrolyses in dilute caustic solutions. Only SiO_2 and Al_2O_3 were found in the dissolved part, and no colloidal iron in the risidue, showing that the hydrolysed portion contains no iron oxides. If "Alite" is the easily hydrolysed portion of cement, the alite is composed only of SiO_2, Al_2O_3 and SaO. Analyses show a constant molecular relation of silica to alumina of 3.75:1. Alite is concluded to have the composition 3.75 SiO_2. Al_2O_3. 11.11 CaO. This agrees well with Keisermann's formula. $-4(SiO_2.\ 2CaO)+(Al_2O_3.\ 3CaO)$—for cement clinker. The yellow-brown substance containing iron oxides does not hydrolyse and therefore, does not take part in the setting of cement. D. Ionescu Bujor. (Anelele Minelor din România *11*, 31-6, 1928 and C. A.).

MEN OF THE INDUSTRY

The portraits printed on this page in each number of PIT and QUARRY are taken from our files and their selection is without significance as to current events or as to the position of the individual in the industry.



Russell Rarey

Mr Rarey is Vice President and
Sales Manager of the Marble
Cliff Quarries Company of Columbus, Ohio

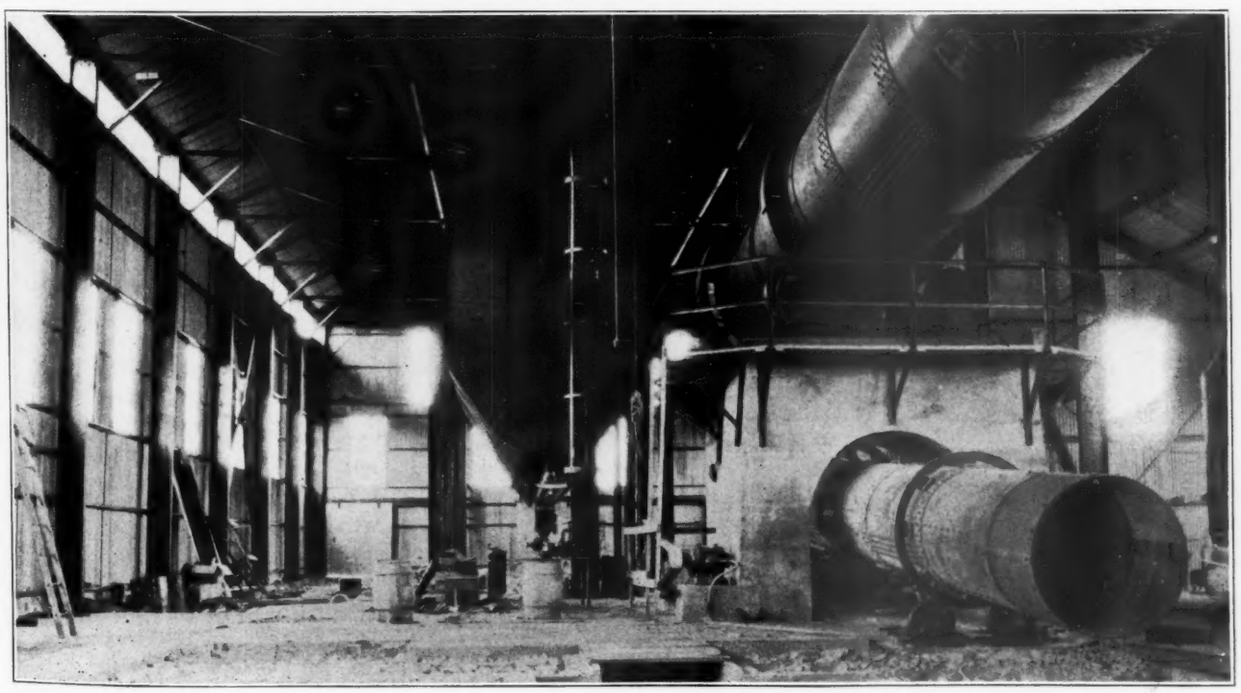
NEW LIME PLANT NEARING COMPLETION

By F. A. Westbrook

Showing the Oil Feed Tank at the Right

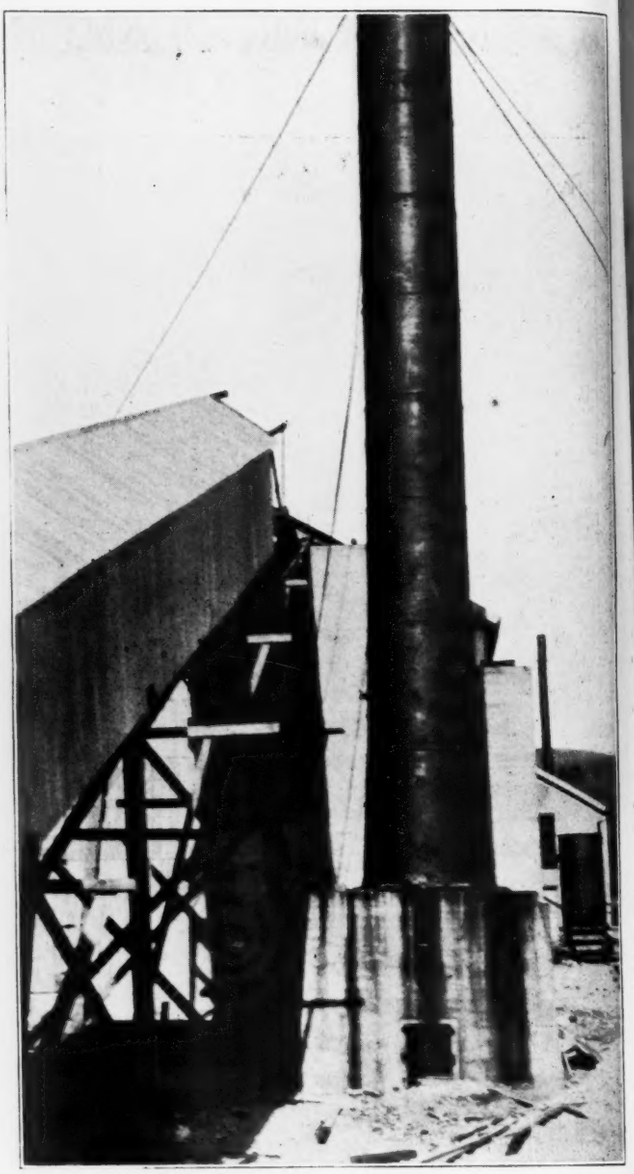
IN AN article appearing in the November 23rd Pit and Quarry mention was made of the new rotary kiln in process of installation by the Berkshire Hills Lime Company at Great Barrington, Massachusetts. In fact this installation, now about ready to begin operations, is actually an entirely new plant operating as a separate unit from the old wood burning kilns which have been in service for many years.

The new plant is located adjacent to the main line tracks of the Berkshire Division of the New Haven R. R. whereas the old plant is situated some distance back and nearer to the quarries. Stone is hauled down to this new plant in dump cars over a narrow gauge track by means of gasoline dinky engines to the Traylor crusher, into which it is dumped from an embankment. From under this crusher the broken up stone is carried on an



Kiln and Cooler for Lime Production

Oil Storage Tank and Connections



Conveyor Running to Kiln

View of Plant and Storage in Foreground

Crusher Beginning Operations

Lime Storage Tank at Scales

inclined Stephens-Adamson conveyor, equipped with a 20 inch Stephens-Adamson "Special" belt, to the crushed storage bins. An "S-A" tripper has been installed which travels on a track extending the full length of the bins by means of which the stone may be evenly distributed. This conveyor is operated by a 7½ h.p. General Electric Company induction motor provided with G. E. control and a Square-D safety disconnecting switch.

Under the storage bins there is a series of sliding gates through which the crushed stone is discharged into a Stephens-Adamson hopper, which is moved on tracks from one gate to another. This

Compressor for Driving Pneumatic Tools

hopper feeds into another 20-inch "S-A" belt conveyor, by which the stone is delivered direct to the rotary kilns. Space and foundation have been provided for the installation of another similar conveyor to feed the second rotary kiln whenever the latter is installed.

After passing through the kiln and cooler the burned stone is conveyed by means of two Stephens-Adamson screw conveyors to an elevator which raises it to the level of the large steel lime storage bin. The short horizontal run from the top of the elevator along the top of this bin is covered by a third screw conveyor.

A Howe automatic scales, suspended under the storage bin and movable for its full length has been provided for filling barrels which rest on a shaking platform. After being filled, the barrels are easily moved to the heading and shipping platform which comprises the immediately surrounding floor area.

The kiln is run by means of a 25 h.p. General Electric induction motor and the cooling cylinder by one of 10 h.p. The motors are equipped with Rockwood paper pulleys and the machines with American pulleys. Crescent belt fasteners have been used, as well as Socony lubricants.

Some of the illustrations show carefully and in what a neat and workmanlike manner the electrical wiring has been installed in iron conduits. General Electric Company push button control and Square-D safety disconnect switches are associated with each motor. Benjamin Type A 100 watt reflectors illuminate the kiln house.

Hummel oil burning equipment is used together with a two stage Ingersoll-Rand compressor. Oil is brought in on a siding in tank cars and is

Upper Left, Conveyor from Storage to Bin. Lower, Conveyor from Crusher

pumped by a Worthington Duplex pump into two large storage tanks through a permanent pipe line. A Walworth gate valve has been installed to direct the flow. From these storage tanks the oil flows by gravity to the oil tank, made by the Coatsville Boiler Company, near the kiln house, from which the oil for the kiln fire is drawn directly.

All foundation work for the buildings and the machinery is of concrete, the framework is of steel and the sheathing of Republic Iron and Steel Company galvanized corrugated iron.

As may readily be imagined, from the foregoing description, the whole plant represents a very high grade and modern construction and installation practice in all of its branches.

Freight Car Loadings

Loading of revenue freight during the week ended on May 19 exceeded the million car mark for the second week this year, the American Railway Association announced recently. Total loadings were 1,003,497 cars.

Compared with the preceding week this was an increase of 1,514 cars due principally to the heavier movement of ore, although there was also an increase in the number of cars loaded with forest products and merchandise less than carload lot freight. Decreases compared with the week before reported in the total loading of 24,001 cars below the same week in 1927 as well as a decrease of 35,573 cars compared with the corresponding week two years ago.

	1927	1926	1925
September 3	1,117,069	1,143,448	1,102,785
September 10	989,472	1,024,998	975,499
September 17	1,127,613	1,182,641	1,112,009
September 24	1,125,868	1,175,407	1,121,025
October 1	1,126,390	1,180,049	1,113,283
October 8	1,100,552	1,074,928	1,106,036
October 15	1,119,872	1,202,780	1,106,009
October 22	1,128,486	1,200,941	1,120,677
October 29	1,112,621	1,208,878	1,091,154
November 5	1,038,852	1,112,621	1,062,646
November 12	974,862	1,106,889	1,049,940
November 19	968,103	1,071,707	1,057,923
November 26	840,803	937,844	923,206
December 3	918,237	1,054,048	1,023,666
December 10	877,600	992,855	1,008,696
December 17	868,162	944.396	969,738
December 24	829,006	768,940	969,738
December 31	679,600	734,281	701,061
	1928	1927	1926
January 7	754,062	933,940	907,622
January 14	906,734	942,731	931,735
January 21	884,095	936,160	921,643
January 28	902,832	943,879	925,696
February 4	926,204	965,664	914,491
February 11	906,009	962,602	917,625
February 18	887,891	954,794	932,281
February 25	869,590	918,858	912,935
March 3	959,537	989,863	965,009
March 10	951,553	1,000,754	967,425
March 17	942,086	1,001,932	977,018
March 24	950,428	1,003,536	967,945
March 31	950,249	986,462	928,303
April 7	919,296	953,907	929,343
April 14	912,377	949,561	964,794
April 21	944,694	950,545	973,158
April 28	961,928	1,021,596	995,408
May 5	979,662	924,761	996,216
May 12	1,001,983	1,029,424	1,029,748
May 19	1,003,497	1,027,498	1,039,070

Annual Asphalt Paving Conference To be Held in New Orleans

The board of directors, at a recent meeting held in Chicago, chose New Orleans as the city in which the Seventh Annual Asphalt Paving Conference will be held during the week of December 10, this year. The American Association of Asphalt Paving Technologists and the Asphalt Association, as well as other organizations, will hold their annual meetings in New Orleans in connection with the conference, which is nation wide. It is expected that from one thousand to fifteen hundred engineers and Federal, state, county and city road officials, as well as asphalt producers, contractors and machinery manufacturers from all parts of the country will attend. The program will consist of discussions extending over a period of several days and will relate to the latest, most effective, and most economical methods evolved for the construction of the several types of asphalt paving. Reduced railroad rates, as for previous conferences, will be in effect on all railroads for the New Orleans meeting.

J. E. Pennybacker, general manager of the Asphalt Association, and secretary of the conference, in discussing plans, said, "Tremendous highway progress is being made in the Southern states, the asphaltic types of paving predominating on the main highways. An immense mileage, however, of gravel and macadam roads now present the problem of resurfacing so as to salvage the original investment and provide surfaces equal to modern traffic conditions. This subject of salvaging the old highways will be one to engage the attention of the delegates at the New Orleans conference. The growing conviction that the secondary, or farm service roads, lying outside of the Federal and State highway systems, should receive greater aid in the form of low cost improvement has become so general as to focus attention upon the development of the most effective methods for low cost improvement, and this will be another of the important subjects discussed. Lowering the cost of construction of the higher types on the main highways of the country, will form another important subject on the New Orleans program."

Utilization of Southern Bauxites

Localities where limestone, bauxite, coke, and scrap can be assembled obviously have a preference for economic reasons. For such a location attention turns at once to the Southern States. The successful beneficiation of high-silica bauxites, a problem under investigation by the Bureau of Mines at its Southern Experiment Station, would make large tonnages of low-grade bauxite available for the manufacture of aluminum as well as alumina cement.

WELL DESIGNED SAND AND GRAVEL PLANT PRODUCES MATERIAL ECONOMICALLY

By John O. Durkee

THE plant of the Keystone Gravel Company is located almost midway between the Miami and Mad Rivers on the Baltimore and Ohio Railroad just out of the city limits of Dayton, Ohio. The deposits, which are exceptionally rich in gravel and stone, were the river bed in the ages before the rivers were separated. Water is exceptionally plentiful in the excavations which makes dredging an ideal operation. There are two recovery operations or gravel pits which converge their material at the one plant. The plant was designed by the F. M. Welch Engineering Company and is noteworthy for its many interesting features.

The Number 2 Pit is operated as an auxiliary feeder to the main plant and has a daily capacity of approximately 1600 yards per day under the present method of operations. At this pit, the material is excavated by a model 90 Wiley Whirley dragline, manufactured by the Dayton Whirley Company, which operates a 3-yard Page bucket on an 85-foot boom using Leschen red strand rope. The main engine is a 3-drum special Clyde unit operated by a Fairbanks-Morse 100 h.p. ball bearing motor and developing 32,000 pounds single line pull and the Clyde swinger is driven by a 40 h.p. Fairbanks-Morse ball bearing motor. The material is deposited into a field hopper, which is movable on the tracks. It is then fed to 20-yard Koppel dump cars and hauled by a 24-ton Plymouth locomotive to the plant, dumped into the conveyor hopper, and combined with the material from the main or Number 1 Pit near the plant.

Dragline, Locomotive and Dump Car at Auxiliary Pit

At the Number 1 Pit, the main factor in excavating the material is a 12-inch Amsco pump, primed with a Wagner Centrifugal pump and mounted on a barge. It is operated by a 350 h.p. 2300 volt, 3 phase, 60 cycle Allis Chalmers motor. The material is fed to the nozzle by a Swintek agitator, which is manufactured by the Eagle Iron Works, and one man is engaged in hydraulicking the material from the bank above the barge into the water. The water, sand and gravel pass through a 10-inch pipe to the dewatering sump which is divided into two compartments, the pipe branching at a Y to accommodate either side of the sump by changing a valve on the line. The material is so discharged into the desired side of the sump which is at the base of the dragline

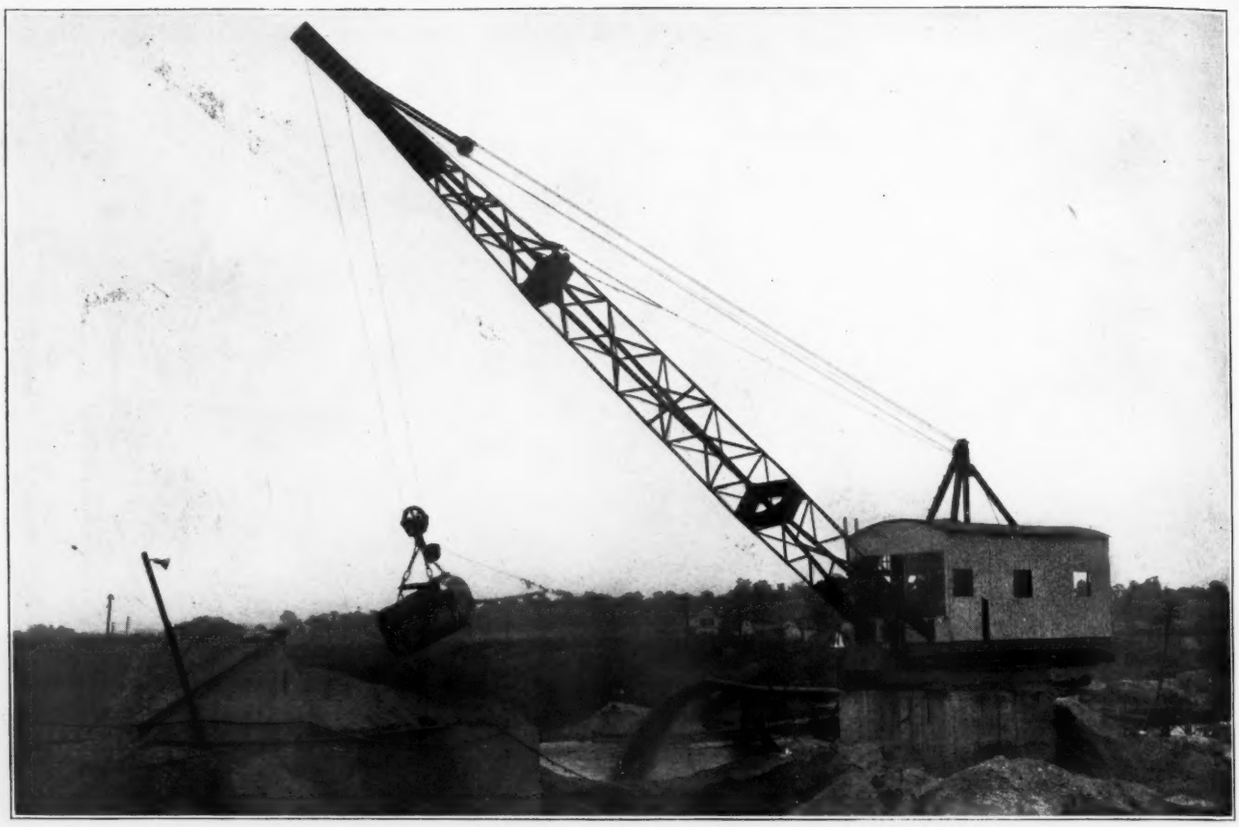
Giving View of Personnel of Plant Which Makes a Large Production Possible, Using Modern Equipment

Close Up of Whirley Loading Field Hopper and Car Being Loaded to Move to Plant

shown in the left background of an illustration. The dragline, a Wiley Whirley, is mounted on a concrete pier between the two sides of the dewatering sump. It carries a 2¼ Page dragline bucket on a 75 foot boom, equipped with Leschen red strand rope. The main engine is a 3 drum, 60 h.p. unit built by the Clyde Iron Works, driven by a Fairbanks Morse 2300 volt, 3 phase, 60 cycle ball bearing motor. The Clyde swinger is operated by a Fairbanks Morse motor. This Whirley has an output of 180 cubic yards per hour under present operating conditions, making a total capacity of 3,400 cubic yards per day for the plant when operating at full capacity.

The Whirley bucket is dumped into the hopper, where this material is combined with the material

View of Main Plant Showing Whirley in Left Background



Showing Main Plant Whirley, Located on Concrete Pier, Between the Dewatering Sumps

from the Number 2 pit. It is then taken by a 30 inch Stearns belt conveyor of 244 foot centers, equipped with Goodyear rubber belting on ball bearing rollers and operated by a 50 h.p. Fairbanks Morse ball bearing motor, to the top of the screen and crusher building and discharged into a 60 inch by 28 foot triple jacket Greenville sand and gravel screen, where the washing water furnished by two 6 inch Weinman pumps, enters to begin the washing and refining process, from which the ¾, ½, ¼ inch and sand go through chutes lined with Strenes metal, to the bins. The material up to 3 inch passes to a Number 6 Superior McCully fine reduction crusher and the tailings to a Number 6 Austin crusher.

The stone from the crushers passes into a hopper from which it is elevated by a Greenville bucket conveyor of 80 foot centers, equipped with 12 by 24 inch buckets and driven by a 50 h.p. Fairbanks Morse motor to a triple jacket Greenville stone screen of 1½, 1 and ¼ inch mesh, driven by the same motor. The tailings are returned to a Number 36 superior Chalmers and Williams crusher and go to the bucket conveyor hopper and returned through the revolving stone screen.

There are eight Neff and Fry gravity bins so located that the product, which is ¾ and 1½ inch crushed stone; 1½ inch gravel; ½ and ¼ inch pebble; and concrete and brick sand, may be loaded either on the railroad for shipment and ballast, or loaded in trucks for highway and building construction in the immediate vicinity. The chutes are so arranged that any desired sizes may be combined from any of the different bins to conform to any combination of sizes in the percentage desired. All chutes and parts of the plant subject to abrasive wear are lined with Strenes metal. The side track is sufficiently large to accommodate 50 loaded cars. These are handled by a Clyde drum type Lincoln electric motor.

Principal officials of the Keystone Gravel Company are: Clifton Hoolihan, president; Ed. Kammer, vice-president and general manager, and George Long, superintendent. The officials of this plant together with most of the employees have been with the operation since the ground was first broken.

Dredge Boat at Keystone Plant

THE BASIC PROBLEM OF INDUSTRIAL ORGANIZATION

By Charles F. Abbott,
Executive Director, American Institute of Steel Construction, Inc.*

BEHIND imposing records of increasing production and sales there lies a dramatic story of a sharp competitive struggle, increasing in intensity. It indicates that business is not altogether as easy to get as it was in 1918 and 1919, and that the profits today go to those who are able to cope with the steadily narrowing profit margin.

Wherever you go you find the general complaint that volume of business is high but prices and profits are low. The lack of profit from sales is unquestionably the greatest problem in industry. A concern not making a reasonable profit is a liability to society and it should be as illegal to accept business on a basis of cost or less than cost, as it is to agree to maintain prices.

If it is impossible to make satisfactory profits during active periods, then what may we expect should we enter a period of possible business depression?

The problem of production and finance have been largely solved. We are now face to face with the problem of distribution, or scientific marketing and selling.

Today, old markets, if we are to hold them, must be intensively cultivated. New outlets must be developed in order that excess plant capacities may be fully absorbed. Orders are not laying around to be picked up without effort.

There are many who believe that our principal problem is that of excess plant capacities. While it is true that undoubtedly there is excess production in some industries, the fact remains that in many cases this excess capacity has been caused by a shrinkage in the market due to outside competition. As the market has declined excess capacities have been created.

We must learn the story of stabilization and accept the idea that it would be a great deal better to operate on a basis of 60 per cent at a profit rather than to make any attempt to operate a plant at 100 per cent on a basis of cost or less than cost. The danger to American industry is not entirely a lack of business, but the failure to maintain prices that include a reasonable profit. We must realize that a million times nothing is still nothing.

Today, economics occupies the center of the stage. Alliances are built upon a mutual exchange of coal for iron, or manufactured goods for raw materials. The creation of a steel or chemical trust is front page news. Progress is measured by the curve of production, of sales, or the volume of power in kilowatt hours.

Increased competition to meet new conditions has developed, and to a large extent is responsible for most of our present-day difficulties. The transition we are witnessing is bringing with it a new competition which in turn calls for a radical readjustment of merchandising policies.

Within the memory of all of us, competition was little more than a cut-throat fight between salesmen representing different houses in the same line. It was full of suspicion, hate and jealousy.

In the days gone by we can all remember when it was permissable for competitors to get together and agree upon prices and restrain competition. Then came the Sherman Law, which made illegal such practices. Under the new conditions thus created a new situation has been developed and today we are face to face with new economic problems. To meet such a condition individual effort is absolutely hopeless. The only way that we can cope with these new conditions is through the power of a national co-operative organization. We find in many instances that buyers are dictating the terms, that they are the better sellers, and that industry to a large extent has lost control and has failed to dominate through aggressive conrol all the terms and prices. The fight is being waged for a part of the consumer's dollar and the number of those dollars is limited. The industry that recognizes this fact and is prepared to engage in this trouble will naturally obtain the larger part, whereas those who are neglectful will naturally suffer in consequence.

The old type of competition no longer exists to any extent, partly because it does not pay, but largely because industry is awakening to a realization that the competition most to be feared is not that existing between concerns in the same business.

At the present time, the majority of our worries are caused by competition coming from manufacturers in an entirely different line of business. We now find industry organized against industry for the purpose of encroaching upon the market of another by substitution of products. We have discovered that our once actively responsive markets no longer exist.

There is sufficient evidence to satisfy anyone that the present may properly be termed the Synthetic Age—the era of Substitution. Let us ana-

*Presented before the National Lime Association in New York City at the Belmont Hotel, May 24, 1928.

lyze the modern young woman whom we meet most any day in the subway. Rattlesnake-skin sandals of synthetic material; synthetic hosiery, underwear; and a synthetic silk gown; bracelets, rings, wrist-watch, ear-rings, beads and other jewelry, all of synthetic material; a synthetic complexion; synthetic perfume; synthetic hair; and a hat of synthetic product; synthetic fur around her neck, and if she happens to be of that type, we might possibly add a synthetic breath—and the whole business costs about $32.12.

Now we are witnessing the new competition where the products of one industry are displacing those of another. New methods to combat it are necessary.

We find that the ice man refused to be frozen out of the industry and has organized to meet the competition of the electric refrigerator as it has been busily engaged teaching the theory of refrigeration.

Oil is displacing coal and the retail coal dealers who previously sold coal are now engaged in delivering oil.

The lumber industry refused to recognize the competition of lumber substitutes which was seriously affecting their business and now it is stated that they have appropriated twenty-five million dollars for advertising in the hope that a part of their lost market may be regained.

The consumption of shoes declined 33⅓ per cent as automobiles took men off their feet and put them on wheels.

In the dentifrice field there is the same sort of competition, between manufacturers of pastes and manufacturers of powders. Here, however, there is little occasion for rivalry, since it is estimated that not more than one-third of the population use any dentifrice at all. The common aim there should be the conversion of those 70,000,000 people who are still heathens so far as the use of mouth refresheners is concerned.

In the kitchen utensil field, the really troublesome competition is not between the various manufacturers of enamel ware, but between all the producers of enamel ware on the one side, and the producer of aluminum utensils on the other.

The consumption of red meat has declined, due to propaganda which has convinced many people that red meat is injurious to the health. The packers got together and are now conducting a program to encourage a greater consumption of red meat. On the menu cards in the dining cars, you will notice advertising literature emphasizing the health-building merits of red meat. A $500,000 advertising campaign to make America "ham conscious" was but recently inaugurated by the Institute of American Meat Packers.

The traction industry plans to meet its keenest competitor, the private automobile, on its own ground by stressing automotive sales methods. The trolley lines decided recently that they could not compete with the gaily decorated and upholstered private automobiles by operating the old-time dark cars; so they set out to manufacture some attention-compelling vehicles.

Of even more startling significance than the growing competition between industries is the competition between various sections of the country in the struggle to find buyers for the commodities upon which their prosperity depends. In some cases the chief commodity is the climate and so we find Florida vieing with California to secure the tourist trade. Even more recently, Hawaii has entered the lists, and now looms as a rival of the older playgrounds of the nation. But this inter-sectional competition is by no means confined to efforts to bring the holiday seeker to the various parts of the country most favored by nature.

A short time ago Atlanta appropriated a million dollars to establish its industrial supremacy in the South and I wonder what Birmingham, Memphis, and New Orleans are going to do to meet this new competition.

The New England States have united to modernize their industries and tell the world about the merits of New England's products. Hard pressed by competition from more recently industrialized districts, the welfare of every man, woman and child in the New England States will be affected for good or ill by the outcome of this experiment.

Let us take one of the most difficult of all products, that of granite.

The "Rock of Ages" Granite Campaign has been eminently successful. It has sold the public on the superiority of granite for hewn memorials. In slack periods it has enabled the quarries and manufacturers to operate on a more nearly normal schedule than the producers of competitive materials. In a highly competitive industry it has helped to stabilize prices by advertising with nothing to sell but the unfinished material—"the sentiment in the rough"—the Rock of Ages Quarries have given the world a new conception of an obligation that is as old as man.

A short time ago, sauerkraut as an article of diet was a joke. During the last three years that condition, largely mental, has been changed. Today, thousands of American families eat, enjoy and thrive on sauerkraut. This change was not an accident. The industry organized. It appropriated several hundred thousand dollars and by constructive group advertising increased the consumption of sauerkraut over twenty per cent annually. The campaign emphasized the body-building, appetite-appeasing, and palate-tickling qualities of that cabbage affair.

Recently a New York banker made the statement that future profits will depend upon application of intelligent, aggressive salesmanship. But

salesmanship based upon a greedy determination to secure all the business in sight, I would put as a principal cause of the present day demoralization, of the business man's mental attitude in our other industries. The fundamental principles of salesmanship, of proper pricing, of costs and profits, are cast overboard, as hysteria is substituted for sound judgment.

Under present day conditions, the most important phase of business is selling. Every successful business man is first of all a salesman; every farmer, every lawyer, every doctor. There are doctors with profound medical knowledge who scarcely make a bare living. There are others with far less knowledge who are making $50,000 or more a year because they know how to hold an old woman's wrist sympathetically and tell her that her husband does not understand her delicate, nervous temperament. The whole problem of life is salesmanship.

The public have no consciousness of price. We all know that if we tell the people often enough and use enough pictures we can change the buying habits of a nation.

Mr. Charles M. Schwab, Chairman of the Bethlehem Steel Company recently made public the statement that the Bethlehem Steel Company had expended $167,000,000 in plant improvements and had given away this huge saving in other directions, undoubtedly due to inefficient salesmanship.

Industrial organization well equipped can write the formula for good cooking, but it is helpless when it comes to making good cooks.

The individual concern has found itself totally unable to cope with the new struggle for markets. The forces that can be marshalled against it are too great. The battle line is too far-flung. The vision to see that the individual concern can prosper only as the industry prospers, offers the sole hope of survival.

Such co-operative activity, aimed primarily at better merchandising methods, offers the assurance of prosperity during the period of transition that is bringing into the limelight, as the future problem, the locating of buyers to absorb what we produce—to make them want what we have for sale.

In this new competition of one industry against another, it behooves all to co-operate to the height of their ability to bring to the door of the consumer its more serviceable way.

There are many members of an industry who feel that their problems can be solved through local associations, but this is a mistaken idea. Most of the problems confronting industry are national in their scope and can only be met and overcome through the power of a national organization. It is well to have local groups or associations to supplement the work of a national organization, but if they are to depend upon local action then their efforts will prove hopeless if they expect to overcome the more important problems, which are entirely national in their origin.

We oftentimes meet the objection that our business is different from all others and what might go in one industry might not apply to ours. This is another mistaken idea because businesses differ only in details, the principle being the same whether we are dealing in aeroplanes, celluloid, structural steel or toothpicks. We must inspire in the minds of all members of an industry the spirit of the industry and leave them to submerge their own individual selfish motives for the good of the whole.

We also find in many instances a belief on the part of some of the larger concerns that the smaller companies should be eliminated. This is another false conclusion because if the smaller concerns were eliminated today we would be confronted with another crop tomorrow that might give us even greater difficulty. The broader viewpoint would be to gather the small companies under our wing and give them the benefit of a wholesome education and it has been my experience that the smaller concerns are only too anxious to profit through such constructive leadership. The small company has a right to its existence and is entitled to its proportion of the business.

You should know the mental attitude of any company whose plant is in need of business. They might be likened to a boa constrictor who wiggles his way out of the jungle and is vicious because he is hungry. Throw him a piece of bread and he will quickly swallow it and find his way back into the jungle to go to sleep and he is harmless.

Many business men seem to have lost all sense of proportion in a wild scramble to maintain volume. The idea to keep a competitor from getting any business at all seems to be the prevailing thought.

In a city that I recently visited we put the capacity and consumption statistics on a blackboard and it was found that the production facilities amounted to 100,000 tons, whereas consumption averaged about 52,000 tons. Under such conditions it was obvious that if everyone made the attempt to get all the business in sight that chaos would prevail. How much better it would be for competitors to get together and recognize such a condition, and through united, concerted effort make possible increased consumption and regain the business they had undoubtedly lost through the more aggressive action on the part of outside competition.

In the city of San Francisco the garbage is collected by scavengers. They got together and organized an association and are conducting their business on a satisfactory, profitable basis. If the scavengers of San Francisco recognize the benefits

of co-operative association then it seems to me that intelligent business men would more quickly recognize the fundamental principle involved.

The individuals comprising the structural steel industry were quick to realize the vital need of a national organization. The American Institute of Steel Construction was launched with a very definite and practical four year program.

They embodied within this program a unique idea in that the principal objective was to further the interests of the public, following which they were sure the industry would derive benefits. In other words, they insisted that public interests should supersede all other motives.

Since that time they have sincerely carried out this thought with the result that their Standard Specification covering steel design has made an annual saving of approximately $30,000,000 wherever steel is used for building purposes. Their Code of Standard Practice is based upon actual results and not mere ethics. The use of this Code establishes the relationship between the buyer and seller and has eliminated controversies and added further economies of benefit to the public. New fireproofing specifications have been prepared which will make further reductions in costs.

A corps of ten district engineers has been organized whose duties will be to first sell steel, recognizing the fact that the more steel that is sold, the more business there will be for each individual.

The preparation of a standard sales manual is teaching the members of the industry to apply aggressive and intelligent salesmanship.

The publication and distribution of over 30,000 copies of the Standard Handbook of Steel Design has established the authoritative position of the institute and its services have been generously recognized.

Advertising and publicity have been directed towards the development of a national association of steel, and the public recognition of the industry and its services.

Technical research and the establishment of scholarships in universities is leading the structural steel industry to improvements which further advance the interests of the public. Its advocacy of the use of steel in private residences is a feature of this program.

The question of income is one of general concern to members of the industry and there seems to be a feeling that money appropriated for any national association work is an item of expense which seems to be regretted. What difference does it make whether a single company contributes five cents or a dollar on each ton it sells, as long as all members pay like amounts, add them to their cost systems and collect from the public, transferring these collections to their national associations to be intelligently and judiciously invested for the purpose of extending the market on a more intelligent and economic basis. While the public pays but a small amount, the benefits it derives through such economies far offset the price charged.

It is a mistaken idea for anyone to believe that an industry can take all out of the market without reinvesting any thought, time or attention in promoting, protecting or advancing the market to insure permanency. We might liken such a situation to the farmer who has continuously taken out of his land until the soil becomes impoverished and sterile. The better way would be to apply fertilizer at frequent intervals and adopt modern methods of agriculture, when by doing so the crops are increased and the productivity of the farm improved. It is so in business, and when the time comes that the members of an industry will recognize the vital need of investing a part of their income in the development of their market then we are going to experience progress and hear less talk about excess plant capacities.

Markets will be extended, consumption increased and individual companies will profit through a better knowledge of business fundamentals wherein the application of this better understanding will develop increased sales no matter whether they are large or small units of the industry in question. To broaden the market and encourage co-operative effort and the application of better methods will become the chief aim of each industry.

The new competition unquestionably is bringing with it a tremendous expansion of opportunity for co-operative organization. Regardless of the merits of the article produced by the industry as a whole, the public will buy only when convinced of its worth.

It has been demonstrated over and over again that we do not act in accordance with the facts, but in accordance with the facts as we believe them to be—with the picture that is prepared for us. The picture accepted by the public is always that which has been painted with deliberate intent.

Every industry, whether centered in a few states or scattered throughout the nation, is the competitor of every other industry engaged in producing materials that can be substituted for its product. Each is fighting for a share of the consumer's dollar, and the number of dollars is limited. No one can buy all that he needs to satisfy his desires. He must budget his expenditures.

This does not mean that there should be any less effort to promote sales. The reverse is true. The industry that is broadening its market is giving its members more room in which to grow. It is making more certain that effort to increase sales will meet with a receptive attitude by the consumer.

(Continued on page 70)

A STRATEGICALLY SITUATED LIME PLANT IN THE GREEN MOUNTAINS

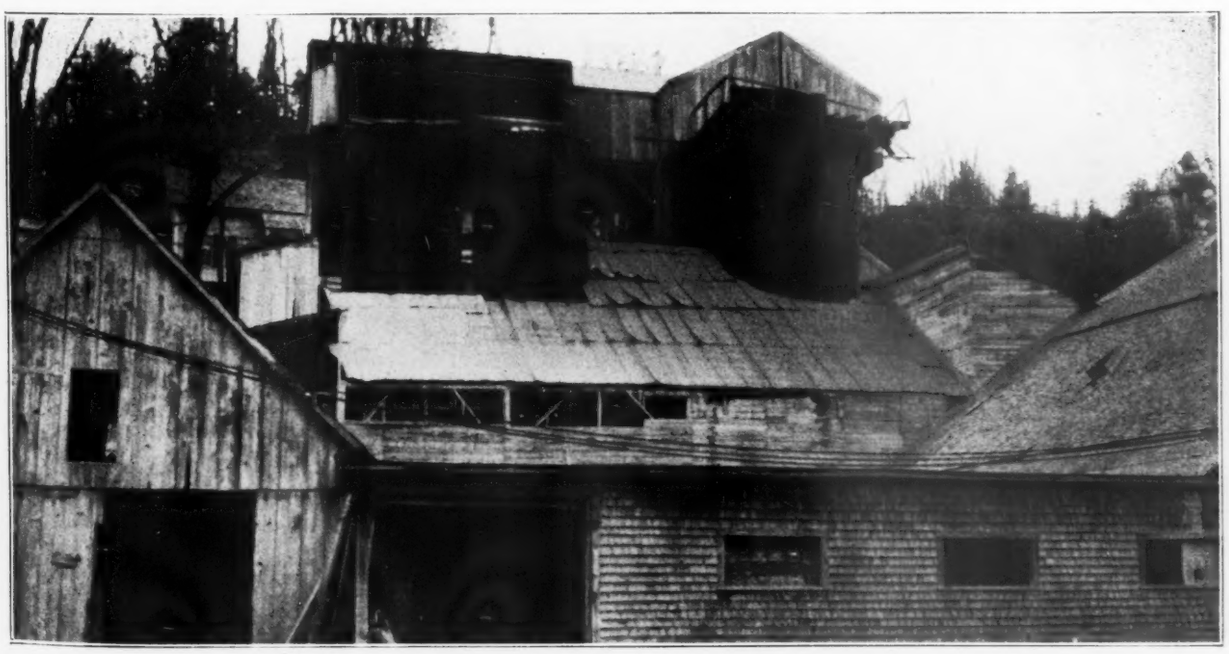
By F. A. Westbrook

THE Amsden Lime Company, of Amsden, Vermont, was founded by Charles Amsden in 1820. The stone then burned was taken from the same quarry now used. The Amsden also built himself a large house of good colonial design near the kilns. It is close to the edge of a small but very picturesque trout brook which rushes through the deep windy valley in the heart of the Green Mountains. This house is now the home of G. M. Baker, president and general manager of the company, and fortunately it was built very substantially in the good old fashioned way and with one end on the upstream side, resting on a ledge of rock. Otherwise it is altogether probable that neither the fine old house nor Mr. Baker would be with us today for this valley ordinarily so peaceful and alluring did not escape the ravages of the terrible floods of last November.

To hear Mr. Baker tell of what happened is most thrilling but it seems that at first the brook rose rather gradually but by late afternoon overflowed its banks and started down the road past the Bakers' house. At first he did not worry about it as sudden freshets were not uncommon in the narrow valley and heretofore they had always subsided as quickly as they came. However as the amount of water kept on increasing, Mr. Baker called out some of his men to dig a trench so as to direct the water away from the lime plant as some seventy-five barrels of lime were stored on the lime drawing floor which is situated at a low level.

While they were thus engaged the water kept rising until the men were in it up to their waists and finally had to give up the idea of the trench. Meanwhile the water had found its way in among the barrelled, unsacked lime and then trouble began in earnest. As soon as the lime began to slack the heads burst from the barrels and the barrels began to burn. It then became a question of fighting, and at one time it looked as if the plant might be burned down. In fact it would have been impossible to save it if the water had risen sufficiently to reach the storage bins, which fortunately it did not, although during the night there was only a foot to spare.

By eleven o'clock that evening the danger of fire was overcome and the flood had receded materially. So Mr. Baker went to bed. About two in the morning he was awakened by the roar of the flood and stones rolled with it. He got up to investigate and found that the water had again risen to an unbelievable extent while he slept, and that night he and his family were marooned in the house by a torrent on all sides which it was absolutely impossible to cross. It was a most dangerous situation for it seemed as if house and all were about to be carried away. How perilous it was may be imagined from the fact that the front steps were carried away and that the raging current swept out a channel sixteen feet deep immediately in front of the house. Had it not been for the ledge of rock on which the upstream end of it rested, it would most certainly have been under-



View of Amsden Plant

Electrical Equipment at Rotary Kiln

mined to such an extent as to be wrecked. As it was, not until noon could anybody get in or out.

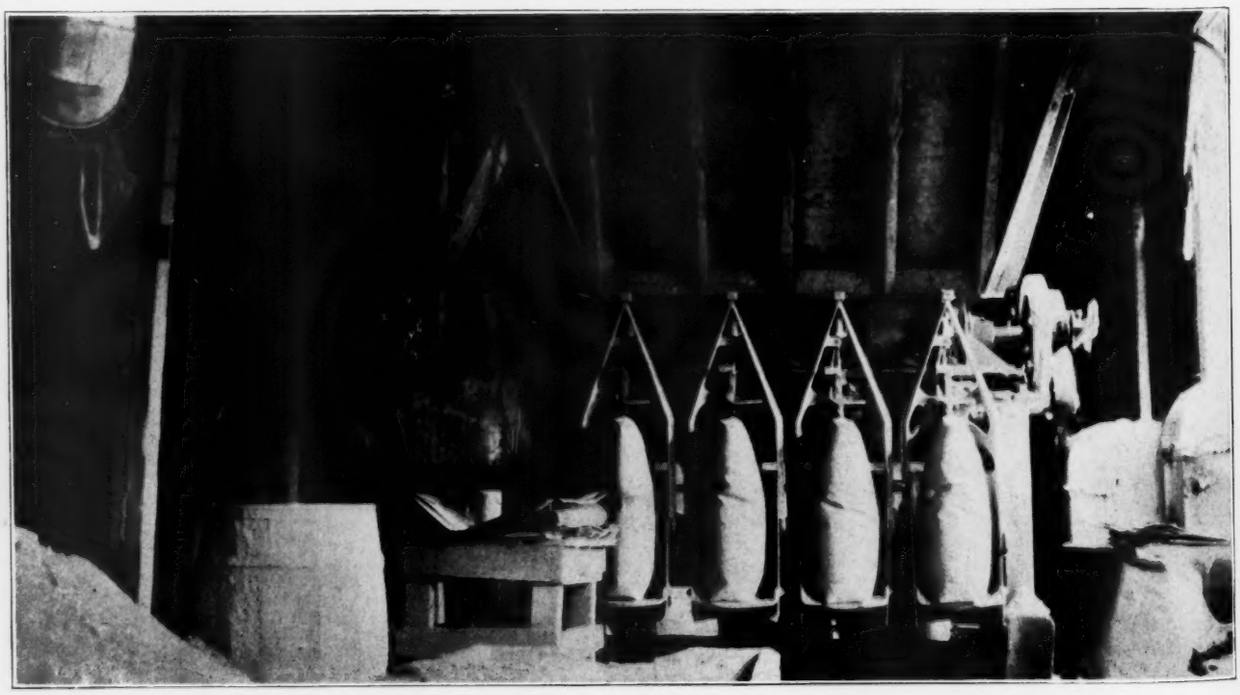
Now of course the sixteen foot channel has been filled in front of the house but a part of it still remains just below and is shown in one of the illustrations.

As a lime producing plant this one is very interesting, largely because of its completeness. The quarry, as already stated, is a very old one from which stone has been taken from the beginning, over a hundred years ago. The composition of the stone is as follows:

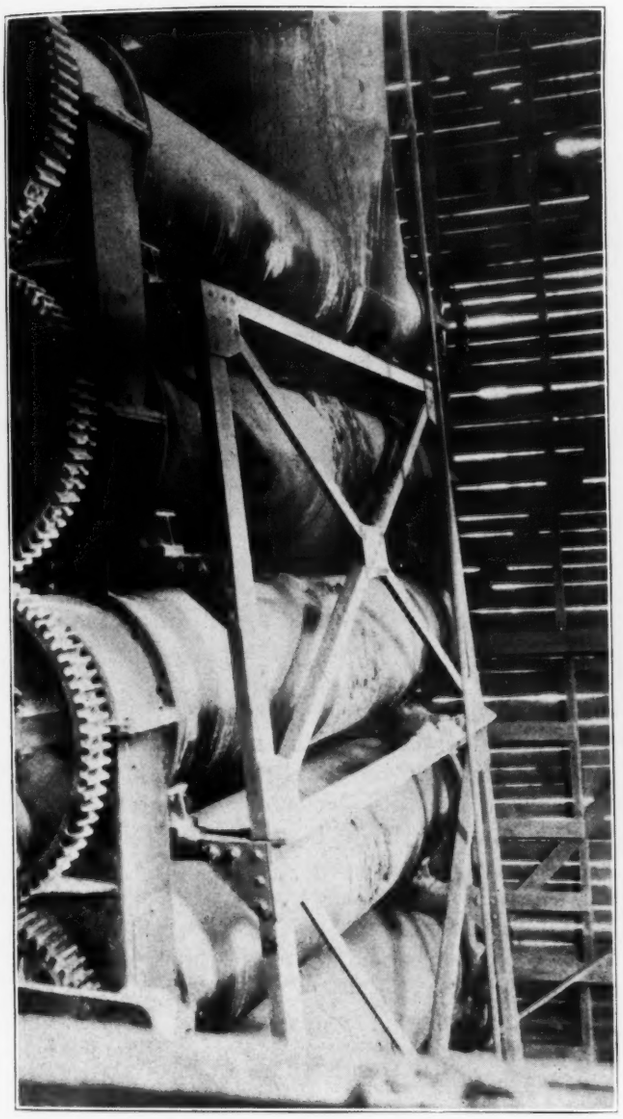
Quartz, phlogopite and other silicates	1.09%
Aluminum, iron, etc	2.00%
Manganese	1.00%
Calcium Carbonate	64.00%
Magnesium	31.00%

It produces a grey lime used for brick work and first coat principally, although there is no reason why it should not be used more extensively for finish where paint is to be applied later. According to Geological Survey Bulletin No. 285 the grey limes are capable of carrying more sand than others which of course is an advantage. The drilling is done with Sullivan jack hammers and is carried on in benches of about 10 ft. The holes are made about 3 ft. apart, and varying numbers up to twenty or more are shot at a time. 40% Du Pont dynamite is used at present.

The overburden is rather thick and consists mainly of sand, gravel and cobbles, suitable for roadwork and fills. It is removed by hand and the method employed is novel. The material is shoveled into a chute leading from the top of a large hopper on wheels on the floor of the quarry. The trucks which carry it away can be loaded direct from the hopper, thus saving a great deal of labor.



Bates Bagger for Slack Lime



View of the Lime Hydrator

House Built by Charles Amsden for Over 100 Years. All of the Hole in Front Has Been Filled In

Bridge on Highway Over Which Stone Is Hauled and Dumped Into Kilns

Wood Storage with Stables at Right

To prevent slides dropping into the quarry a line of piping has been extended all the way across the top of the breast.

It is Mr. Baker's intention to lower the floor of the quarry considerably this summer, as it is composed of good stone and to use it will save stripping. A shallow cut through one end of the breast where it is low is to be extended to the brook to provide for natural drainage.

The stone is taken to the kilns, a short distance away in horse-drawn carts. They are driven over a bridge, shown in one of the illustrations, and dumped directly into the kilns.

Before leaving the ledge, it is necessary to take note of a very interesting new development. This is the production of ground agricultural limestone, especially for the many farmers within a radius of about 25 miles. Although the grinding equipment was installed only last winter, the company has more business than it can apply and it is necessary to operate this part of the plant overtime. The reason for this is that the saving in freight rates is so great that it is possible to sell this agricultural limestone at important savings, and Vermont farmers are shrewd enough to avail themselves of such economy. Deliveries are made with Reo Speedwagons and Indiana trucks.

A new part of the ledge is worked for this purpose. The stone is loaded into an Eastern side dump which is pulled into the plant by a Sullivan

Main Quarry from Which Stone Has Been Taken for Over 100 Years

Front Firing Floor

electric hoist. It is then dumped into a Jeffrey pulverizer from the bottom of which a Jeffrey elevator deposits the pulverized stone in a bin. Under this there are spouts for bagging or loading trucks in bulk. Drilling here is done with Sullivan jack hammers in much the same way as already described. A Sullivan air compressor supplies air for all of the drilling.

Now let us give our attention to the burning and later processes. The old original kilns are of course no longer in use but their foundations are still to be seen. Now there are two Arnold-Weigel kilns and another made of steel, dating from an earlier day. These kilns are so placed that the drawing floor is near the bottom of the valley, which was unfortunate during the unprecedented floods of last autumn which exceeded anything experienced during the long life of the operation and which in all possibility will not happen again for another hundred years or more. At any rate the kilns are very conveniently placed. The sides of the valley are steep so that it was an easy matter to build a bridge from a specially made road to the top of the kilns so that the carts loaded with limestone may be dumped in without further handling. The firing floor is just below a lower road, which in fact is the main highway, so that carts loaded with wood may dump their loads where needed so as to reduce handling to a minimum.

Wood is burned exclusively. Some of it is purchased from farmers in the surrounding territory but most of it is cut by the company's men in its own woodlots. Two thousand cords are used per day per kiln.

Some of the burned lime is barreled in lump form and a good deal is ground in a Sturtevant pulverizer. Dust from this is removed through a shaft by means of an exhaust fan. The ground lime is deposited in a bin by a Jeffrey elevator. Under this bin there is a spout for filling barrels with ground lime or for discharging it into a chute which delivers to an elevator leading to the top of the Kritzer hydrating equipment. A Deming pump supplies the water. By the time the hydrated lime reaches the bottom, or fifth horizontal cylinder of the hydrator it is dry and is then carried to the Raymond roller mill by a screw conveyor. A Raymond fan lifts the finished product into the storage bin from which the Bates valve packer is supplied. A dust collector has also been installed. A 40 h.p. motor drives the fan and a 20 h.p. motor the water pump, hydrator, cylinder, screw conveyor and elevator.

Although this plant is not located on a railroad it is so situated that it can truck to any of three freight stations, on the Boston and Maine, Central Vermont or Rutland Railroads respectively. It is thus possible to secure more favorable freight rates than would be the case if all shipments had of necessity to originate at the same point on one railroad.

Thus, in spite of the fact that this plant, located in its beautiful spot in the Green Mountains several miles from the nearest railroad, might at first seem rather isolated, it is actually very strategically situated and the manager has been wide awake enough to take advantage of it.

Building Construction Recovers in China

Building construction in the International Settlement of Shanghai during the last decade reached its peak in 1925 when a total of 8,966 building permits were issued by the Shanghai Municipal Council, according to Trade Commissioner A. Viola Smith, Shanghai. The number of permits issued decreased in 1926 to 6,247 and in 1927 to 3,620. Building construction, which had come to a sudden halt in 1927, owing to the uncertainty caused by the general political and military upheaval throughout China and the general exodus of both foreigners and Chinese, has gradually recovered during the first quarter of 1928.

CHEMICAL RESISTANCE OF CEMENTS

DR. GRUEN discussed at great length the action of sea water on concrete in an address which he delivered at the International Congress for Testing Technical Materials, which was held in Amsterdam (see Zement, 1927, number 49). Dr. Gruen discussed in the course of his talk the investigations that he made on the behaviour of ordinary cement in-admixture with blast furnace cement and also the resistance of these mixtures towards all sorts of solutions of salts and acids. There is nothing to show that the addition of blast furnace cement to ordinary Portland cement can theoretically improve the resistance of the latter. However, inasmuch as efforts in concrete construction work have been particularly directed at the present time to the attainment of maximum initial strength, the addition of blast furnace slag cement to the common grades of Portland cement must be avoided for practical reasons. For the addition of the slag cement to the Portland cement would render illusory the attempts that have been made within recent years to produce a product which has as high as possible an energy of hardening within the first few days.

Aside from this fact the diagrams of the Gruen's tabulation number 2, but with two exceptions, contain no values, which yield any noteworthy conclusions regarding the chemical resistance of the cement. A comparison of the experimental results, which were obtained by Gruen, with mixtures of Portland cement and slag cement in sodium sulphate, with the experiments that were carried out in the experimental laboratory of the Hemmoor cement works and which were concerned with a series of cements made up in different forms that were stored in sodium sulphate, would be very interesting.

The Hemmoor experiments and investigations extended over a considerably longer time period and were carried out in greater concentration of cement mixtures. They yielded the conclusion that the cements, which were prepared by admixing blast furnace slag cement with the Portland cement, were completely destroyed after a period of one year, while the finest ground Portland cement disintegrated after three years of storage. Ordinary Portland cement was found to maintain its strength in full after seven years had elapsed and was faultlessly compact and firm. Tabulation number 1 affords a clear picture of the results obtained in these experiments.

All the cements were completely disintegrated after a period of one to three years had elapsed. On the straight Portland cements retained their strength and compactness and even after they had been allowed to remain for a period of over seven years they showed the extraordinary strength in tension of 59 kilograms per square centimeter.

TABULATION NO. 1.

Sixteen Percent Sodium Sulphate Solution

Days	Ordinary Cement No. 377	Iron Portland Cement No. 25	Slag Cement No. 25	Portland Cement Fine 0.2 / 4.2 No. 27	Portland Cement Medium Grinding 1.6 / 14.0 No. 28	Portland Cement Coarse 2.3 / 26.8 No. 29
7*	26.9	24.0	27.0	34.4	27.6	23.7
14**	36.9	28.2	31.2	36.0	34.2	26.1
28	41.9	29.7	35.5	40.2	34.9	27.5
56	44.6	27.6	31.4	44.4	37.1	27.2
90	45.2	25.2	28.0	45.4	38.5	26.7
180	41.2	17.4	25.5	48.5	29.9	20.5
1 yr	48.6	disinte-grated	disinte-grated	38.6	19.0	5.1
2 yrs	38.9	.....	.....	21.4	disinte-grated	disinte-grated
3 yrs	....	.....	.....	disinte-grated	.....	.....
7.5 yrs	59.1	.....	.....	.....	.....	.....

*One day in air and six days in factory water.
**One day in air, six days in factory water and seven days in solution.

The samples of Portland cement which were located in the topmost series were maintained in almost faultless condition. The next three series contained samples made from one and the same Portland cement, but on the other hand the fineness of the grinding of the cement varied. The cement, which was employed for making the samples of series two, was coarsely ground, a residue of 26.8 per cent being left behind on a 4900 mesh screen. The cement of series three was normal and the residue left behind on the 4900 mesh screen was fourteen per cent, while the cement used in making the samples of series number four was very finely ground, the residue on the 4900 mesh screen being only 4.2 per cent. This cement was very much like supercement in this respect. The strength figures for this sort of cement are also shown in the tabulation after periods of seven and fourteen days. The samples, which were disintegrated until they lost all their characteristic properties, belonging to series 5 and 6, were prepared with iron Portland cement and blast furnace slag cement. The picture of the disintegration of the cement is very remarkable and more so than in other cases for it is just these cements which have been commonly held to possess striking resistance to the influences which brought about the decomposition and disintegration.

When these results are compared with the Gruen experiments, then the strength figures which were obtained with Portland cement-slag cement mixtures after a period of two years had elapsed must be considered as being really remarkable. The strength of twenty kilograms in tension and over that figure is being referred to. Although these samples, which were mixed with blast furnace slag cement, were maintained in good condition even after the chemicals had been allowed to exert their influence on the samples for a greater period of

time, nevertheless in view of the Hemmoor tests these results appear improbable.

The addition of blast furnace slag cement to the Portland cement is not recommended from the standpoint of the resistance of the mixture to magnesium sulphate. The addition of the slag cement, that is cement made from certain definite qualities of slag, appears however to have some resultful influence on the resistance of the cement to the action of magnesium chloride, and only as far as this chemical is concerned. The experiments, however, show that great differences exist between the influences of individual slags, and hence it is highly recommended that a very careful study be made of the entire situation and experimental investigations undertaken before a final conclusion is reached or a method is adopted for obtaining these mixtures.

As far as the other results of the investigation are concerned, it appeared to me to be of little value to draw into the field of so general a discussion the action of the free acids and substances, which must necessarily be developed during the progress of these investigations. The term, acid-resisting, is often used in speaking of cements, and the author wishes to say here very emphatically that this misnomer should not be used in characterizing cements, for the simple reason that there is no such thing as an acid-resistant bonding agent of cement character. Cements and bituminous or bitumen-containing bonding agents are of course available, which can be used with good results in special cases where the product has to come into contact with acid. It must not, however, be forgotten that these bonding agents are made in a manner entirely different than Portland cement is made and are indeed entirely different substances. Furthermore, these products cannot be tested according to standard testing methods on the basis of their chemical composition. It is for this reason alone that their use is prohibitive as a bonding agent in reinforced concrete construction work.

Aside from such bonding agents or media, it is self-understandable, as has been mentioned, that each and every cement is destroyed by free acid. It therefore appears to be proper to me to include in this discussion a description of the behaviour of concrete in sea water and the influence of free acids on it. However, objection must be made under all circumstances if Dr. Gruen desires to draw any conclusions on the resistance of various cements to the action of sulphates when the samples are stored in linseed oil.

Linseed oil, it is known, contains organic unsaturated acids of the type of oleic acid, which form oxy-acids due to the action of the oxygen of the air on the ethylene bond, when the oil is allowed to remain in contact with air. The absolute disintegrating action of this acid is known from that of lactic acid. When the cement sample is placed in linseed oil, then this represents only a disguised action treatment, and for this reason it cannot be accepted as a criterion on which to judge the resistance of the cement samples to the action of salt solutions. It is just as easy to place the cement samples in solutions of lactic acid or concentrated sulphuric acid and thus obtain direct results on the acid resisting properties of the cements.

Ammonium salts act in the same way as free acids. Their action on cement in the nature of free acids is due to their high degree of dissociation. It is recalled that Prof. Mautner reported at the annual meeting of the German Concrete Association in 1926 on the deterioration of the structures which were made of concrete and which were used in the plants of the I. G. Stickstoffwerke A. G. in Ludwigshafen. There does not seem to be any method which can be used to avoid this deterioration, although it was found that when blast furnace slag cement is employed, the results are better than when ordinary Portland cement is used. However, from the standpoint of the practical man the problem cannot be considered as being solved when a structure is made to last four years in place of two years. The cement must still be considered to be unsatisfactory.

In those cases, where deterioration is unavoidable, it is of course an advantage that the structure lasts twice as long when the right kind of cement is employed. On the other hand the problem must not be considered as having been solved. It is therefore clearly understandable that efforts must still be made to increase the lasting qualities of the cement and of the structures that are made from it, and where it is not possible to attain the latter result by improving the quality or altering the composition of the cement, a proper protective coating must be provided. However, such a protective coating is not absolutely certain protection against the destruction of the cement substance, and it is always highly recommended that a cement is employed under the protective coating, which cement will be as highly resistant as possible to the action of the destructive substance that is stored in the tank, if perchance the protective coating is punctured and the liquid thus comes into contact with the cement walls of the container. When such a cement is employed, then the action of the liquid on the cement will be slow and not extensive enough to cause the complete failure of the tank.

The action of ammonium salts on blast furnace slag cements was studied from this standpoint. The various test samples were first placed and stored in solutions of ammonium nitrate, and then in a second mixture containing ammonium sulphate and ammonium nitrate. Inasmuch as mixtures of these two salts are often found in practice, the study of solutions of these two salts appeared

to be of special interest and advantage.

In addition to samples of blast furnace slag cement samples of best quality Portland cement were also subjected to the action of these solutions. While the solution of ammonium nitrate alone was used with a content of 10 per cent of ammonium nitrate, the mixed solution contained 7.5 per cent of ammonium nitrate and 12.5 per cent of ammonium sulphate in one hundred cubic centimeters of water. These percentages of the salts correspond to their molecular ratio. The results fully corroborated the expected superiority of the blast furnace slag cement over standard Portland cement. While the comparative samples, made from standard Portland cement, which had a strength of 530 kilograms per square centimeter in compression after being allowed to remain in ordinary water, were completely destroyed under the conditions of this experiment, the samples of slag cement were still able to give the following strength figures after they had been allowed to remain in the combined ammonium nitrate and ammonium sulphate solution for a period of six months.

TABULATION NO. 2

Compression Strength of Slag Cement Samples 7.7 centimeter cubes, which were allowed to remain for twenty-four hours to set and harden and then were placed in the following solutions for a period of six months.

Water		Ammonium Nitrate Mixing Ratio		Mixed Salt	
1:3	1:6	1:3	1:6	1:3	1:6
626	40	...	...	...	78
626	40	540	96	330	84
617	42	572	88	353	88
636	41	556	92	338	83

It is seen from these figures that salt compounds are also formed in the slag cement samples, which can lead to reduction in the strength of the sample in the richer mixtures apparently due to compression strains. On the other hand in leaner mixtures, that is just those which are predominantly employed in concrete construction, the strengths of the slag cement samples are considerably better when they are stored in solutions of the two ammonium salts than when they are stored under pure water.

(Continued from page 62)

Industries are accepting organization as the one medium through which improvements may be obtained. Advertising and the application of the most improved methods of salesmanship supplemented by individual advertising and promotional effort will prove the most economical method of advancing the welfare of an industry.

Advertising has proved the best means of stimulating desire so far as an industry is concerned. So long as the elements used are truth, skill and a sound knowledge of market conditions, advertising will continue to advance industry through the bewildering maze of the transition it is undergoing, and place it firmly before us.

The industry which grasps the full meaning of the new form of competition, and adapts its policies to meet it, will inevitably out-strip those who are unable to recognize the change that confronts them, or who fail to place the proper valuation upon public opinion as the controlling factor in industrial progress.

Standardize Concrete Floor Forms

Manufacturers, distributors and organized users of concrete ribbed floor construction, are being circularized by the Division of Simplified Practice of the Department of Commerce, for written acceptance to the simplified practice recommendation for Forms for Concrete Ribbed Floor Construction, approved by a general conference held March 21, 1928, Biloxi, Mississippi.

In the communication sent the industry the Division of Simplified Practice stated that "while the action of the first general conference is based on a careful study of conditions and requirements, it will be suceptible of such modifications as future trends in the industry may render desirable."

Cost of 31,000 Miles of Highway Can Be Saved In 1929

There will be an economic saving of $340,000,000 in the road program in 1929, it was estimated by the American Road Builders' Association at its recent annual meeting. This may be accomplished by the utilization of the recently developed road-building and maintenance equipment and the latest improved construction and maintenance methods.

An increase of 10,000 miles of hard surface roads or approximately 31,000 miles of low cost improved roads can be obtained if this saving is applied to the construction of additional miles of roads to the highway system in the United States.

The newly invented and developed road equipment for the construction and maintenance of all types of highways will be on exhibition and the latest approved road building and maintenance methods will be described at the next exposition and convention of the American Road Builders' Association, which, it was announced recently by President R. Keith Compton, will be held in Cleveland, Ohio, January 14-18, 1929.

British Columbia Plans Road Programs

A program for highway construction, which is designed to link up all important centers of population in the interior of the Province of British Columbia, has been announced by the Minister of Public Works. The program will get under way during the spring as soon as weather permits in order that all roads to be constructed may be completed at approximately the same time.

BUDGETING SALES AND SALES EXPENDITURES

By J. J. Berliner

OWNERS or officials of a concern should of necessity estimate the probable sales of their business for each season or fiscal period. These estimates may be made very unscientifically and be recorded quite informally, or they may be made as the result of a very careful analysis of all the factors involved and presented by means of a formal report. But, in any case, an estimate of sales should be prepared as a basis of planning for the future.

In any manufacturing concern, the volume and nature of production is dependent on the sales estimated. If a sales estimate is not made by the sales department, the probable sales must be estimated by the purchasing department or the production department, otherwise these departments have no basis for their plans. It is, therefore, the purpose of the present discussion to emphasize the point that it is properly the function of the sales department, to prepare this estimate, and to explain the method by which it is prepared.

The sales estimate is most essential for the co-ordination of all the departmental activities. The production manager must base his production program on the anticipated sales; otherwise excess stocks will accumulate or orders will go unfilled. The plant engineer must plan his building and equipment program to meet the production program demanded by the sales estimate. The employment or personal department must consider the increased or decreased demand for employees which will result from the program of the next budget period. The purchasing agent must make contracts for raw materials and supplies and schedule deliveries in order to meet the demands of the production budget. The shipping department must adjust its capacity to meet the demands of the sales program, and the consequent production program, in order to provide for the necessary funds. Thus each department is affected by the volume of business, and the volume of business is determined by the amount of sales. Therefore, a knowledge of the amount of sales anticipated is necessary in order to plan the operation of the business in such a way as to secure co-ordination, and without co-ordination, efficient administration is impossible.

Basis of the Sales Estimate

The sales estimate is a report which gives in a summarized, but comprehensive form the sales which the sales department desires and deems possible during the next budget period. In the preparation of this estimate, information of various kinds must be considered, which information may be classified under the following general headings:

1.—Knowledge of general plans and policies of the concern. Such information is obtained from the decisions of the owners or executive officers and board of directors.

2.—Knowledge of trade conditions. Such information is obtained as a result of market analysis.

3.—Knowledge of the amount and nature of previous sales as shown by the accounting records. Such information involves sales analysis and comparisons.

Revision of Sales Estimate

After the sales estimate is submitted by the sales department, it should be carefully studied by the owner or executive officials of the concern and revised in the light of their information and judgment. It is useless to formulate a sales program which is beyond the capacity of the production department to satisfy. Consequently, data must go obtained which will show production capacity. It is then possible to determine whether the quantities called for by the sales estimate can be produced. If not, it is necessary to determine which items should be reduced or eliminated.

Revision of Sales Estimate in Terms of Profit

Another important factor in deciding the desirability of the sales program proposed by the sales department is the estimated profit. It is desirable that the profit to be obtained by the sale of each item called for by the sales estimate be determined if possible. It is undesirable to produce and sell a product which does not yield a satisfactory profit if it can be prevented. Sometimes, however, because of competitive conditions, it is necessary to sell certain items in order to meet the demand of customers.

So that in the revision of sales estimates in terms of profit, it is necessary to give careful consideration to the problem of providing complete lines, so that products may not be eliminated which will result in decreased sales of other products. On the other hand, care must be exercised to prevent the carrying of too many profitable items.

The Sales Budget and Consideration of Maximum Gross Profit

In revising the sales estimate in terms of profit, it is necessary to consider not only the profit which has resulted from past operations, but also the probable profit which will result from anticipated operations. Changes in method or volume of production, as well as changes in method or volume of sales, may affect materially the profit obtained. In order to estimate more accurately the effect of these changes in production or sales, it is desirable to consider the cost of production and selling and

administrative expense and the effect of the new program on these items. It is imperative that careful consideration be given to these factors in the revision of the sales estimate.

The sales program must provide for the maximum profit that trade conditions will permit consistent with the permanency of the business. Here is one of the vital points in making over the sales estimate of volume into a sales program. The management must decide not only that increase in business is desired, but also that volume of business can be had at a maximum gross profit of selling price to the customer over the cost of production. Consequently, the estimated volume of each line, even of each class and kind of foods, must be re-estimated at the volume that will produce the greatest amount of gross profit.

Revision of Sales Estimates

According to Financial Requirements

In the execution of sales and production, finances are required. An important factor, therefore, which must be given careful consideration in the formulation of the sales program are the financial requirements. There are two ways in which the financial requirements may be considered. After the sales estimate has been revised, taking into consideration production capacity, profits, and the like, the amount of capital required to execute this program may be estimated. If this amount is in excess of that which the financial resources of the business will permit to be expended, it is necessary to revise the sales program. In making this revision, the various factors previously discussed will be taken into consideration.

Formulation of the Sales Program

In the previous discussion, the most important factors which must be considered in the revision of the sales estimate have been explained. It should be realized, of course, that no attempt has been made to treat of all the factors which may need to be considered in particular cases. If the sales estimate is considered and revised in the manner suggested, the result will be the formulation of a sales program based on the following:

1.—Past sales as reflected in the sales account of previous years.

2.—The general plans and policies of the concern as reflected by decisions of executive officials.

3.—Trade conditions as determined by the study and research of the sales department.

4.—The judgment of the sales unit, which makes the original estimate.

5.—The judgment of the executive officials or owners, which revives the original estimates and makes such changes as it deems necessary.

6.—The production or purchasing capacity of the business as reflected in the production and purchase estimate.

7.—The gross profit-earning capacity of the different lines.

8.—The selling and administrative expenses involved in handling different lines.

9.—Financial requirements of the planned program.

10.—The coordination of all the departmental estimates into well rounded program for the whole business.

11.—The sales budget, showing the volume of operations which the sales department is expected to perform, based on the budget of the business as a whole.

The process of making the sales program is not a simple one. Rather a sales program must be thought of as a combination of several estimates. It is a statement of past experience modified by future plans, which are in turn modified by trade conditions.

Difficult Problems in Preparing Sales Budget

The chief difficulties encountered in the preparation of the sales budget have been indicated in the preceding discussion.

In order that these difficulties may not be disregarded or minimized, it is deemed desirable to summarize them here. They may be stated as follows:

1.—Market fluctuations, which make it difficult to forecast future sales.

2.—Seasonal fluctuations, which make it difficult to coordinate sales with production.

3.—Inadequate statistics with reference to past sales, which make it difficult to estimate future sales.

Although it is impossible to eliminate these difficulties, it is possible to overcome them to a considerable extent.

Need for Estimate of Selling Expense

1.—That the sales department may be able to judge the desirability of its contemplated sales program. Without knowledge of its probable cost, it is unable to prepare and present for executive consideration an acceptable program.

2.—That the sales department may have a basis for planning its sales campaign. It must know the funds which are available before it can enter into contracts for services or engage help.

3.—That the treasurer may know how the probable disbursements required by the sales program and can plan to obtain the funds necessary to meet these disbursements.

4.—That the financial requirements of the proposed sale and production programs may be judged at the time they are submitted to it for consideration. The selling expense in many cases constitutes one of the major items which appear on the disbursement side of the financial budget.

Importance of Sales Expense Control

It is highly important, that an effective control be exercised over sales expense if the greatest amount of profit is to be derived from the sales operations. Unless that is done, this type of expense is apt to increase unduly.

The services obtained from the expenditures of the sales department are in the main of an intangible nature, and therefore difficult of appraise. For instance, it is usually difficult to determine accurately the benefit obtained from expenditures incurred for advertising, and the same is true to a considerable degree of expenditures for the services of salesmen. There are some direct results which can be traced but in many cases the major results are so indirect that they cannot be connected directly with the expenditures.

If a purchase of materials is made for the production department, it is possible to connect directly the material received with the funds expended. It is possible to judge the wisdom of the expenditure by determining the value of the materials, but if space for advertising is purchased, it is usually not possible to determine the number of orders which result from the expenditure. It is also difficult to determine for how long benefit may be derived from the advertising. Orders may be received as a result of the advertising some time after the expenditure for it is incurred. Then again, a salesman may build up good-will for his concern which will bring in orders after his services are ended. Because of this indefinite relation between cause and effect, executives are apt to think that the sales expense is necessary and should be incurred even though direct results cannot be seen, and therefore, they may not scrutinize closely the amount and nature of this expense.

Moreover, hardly any satisfactory standard exists by which to judge selling expenses. It is impossible to determine the amount of raw materials and supplies, etc. necessary to produce a product and use this amount as a standard to judge the future consumption of materials in the production of the product. But there are no exact means of determining the amount of selling expense which is necessary to secure a dollar of sales, and it is, therefore, more difficult to formulate a standard by which to judge the quantity of selling expense.

Because of these conditions it is especially necessary that formal and exact control of selling expense by exercised. The control involves three steps:

1.—Determination of what is included in selling expense and the setting up of a proper classification thereof.

2.—Determination of standards by which to judge the amount of selling expense, and the use of these standards in the formulation of a selling expense budget.

3.—Determination of methods of enforcing the standards set and the execution of these methods.

Classification of Selling Expenses

It is customary to charge as part of the cost of goods sold, all expenditures incurred in connection with the product up to the time when it is ready to be offered for sale. This is based on the theory that the sales department does not have jurisdiction of the merchandise prior to this time and is not responsible for the expenditures incurred in connection with it. The first expense incurred by the sales department is in the securing of sales orders. This expense will include the cost of advertising. After the goods are sold, they must be prepared for delivery to the customer, which involves packing in cases and shipping. On the basis of the foregoing discussion, it is possible to set up the following classification of sales expense:

1.—Sales office expense.
2.—Salesmen's salaries and expense.
3.—Packing and shipping.
4.—Advertising.

Sales Office Expense

Sales must always be subject to some executive supervision and this supervision results in expense. The nature of the supervision exercised over sales will depend upon the size and organization of each individual concern. In most businesses there is a sales manager who is the executive head of the sales department, and frequently he is assisted by a staff.

As the sales organization grows, care must be exercised to avoid incurring unnecessary expense. It is but natural that each subordinate office will desire to enlarge its activities as much as possible, and because of this tendency there may be a duplication of work.

Salesman's Salaries and Expense

There is usually little difficulty in deciding as to the items which should be included under the heading or as to the proper method of recording and reporting them. The chief problem is the controlling of such expenses, for they have a tendency to become unduly large unless an effective check is exercised. One of the chief sources of difficulty is the determination of the proper method of compensating the salesmen for their services.

If definite salaries are paid salesmen, it is often difficult to determine the equitableness of the amount paid. In any attempt to lessen the difficulty, salesmen may be paid in whole or in part on a commission basis. Some sales executives think that a salary plus commission is the most desirable method on the theory that the work of a salesman cannot be judged entirely by the sales which are directly attributable to him. He may have a certain advertising value to the business which is not

adequately measured in terms of the sales orders which he turns in. A salary which is not directly dependent on the volume of sales, remunerates him for the work which he does towards building up the good-will of the firm; whereas the commission which he receives, based on the volume of sales secured or on the excess of sales over a certain amount, rewards efficiency and penalizes inefficiency. Those who are exponents of the payment of a commission only contends that the salesman is remunerated for the work he does in building up good-will by the additional orders which he will receive later on. If all orders received from the salesman's territory are credited to him, there is merit in this contention.

The method to be employed in remunerating the salesmen is a problem of the sales department, but it has an important bearing on the preparation of the estimate of selling expense, it is of interest to the student of budgetary control. It may be added that if a proper control is to be exercised over these expense, it is necessary to have records and reports which will provide an analysis of sales and selling expense showing:

1.—Whether the salesman or the territory is responsible for the sales.

2.—Whether the sales which are being made are of the goods which the company most desires to sell. The latter, at least, can be determined by obtaining the profit realized on sales made by each salesman and judging his efficiency in terms of profit rather than by volume of sales.

Preparation of Selling Expense Budget

The sales office expense estimate will be prepared by the staff of the executive head of the office. The salesmen's salaries and expense estimate should be prepared by the immediate superior of the salesmen for whom the estimate is made. If there are branch and division offices, each of these will prepare an estimate for the salesmen belonging to that office, and after it is approved by the manager it will be forwarded to the sales manager at the general office.

The packing and shipping expenses will be prepared by the head of the shipping department and forwarded by him to the sales manager.

The sales manager will make such revisions as he thinks necessary in the estimates of his subordinates and forward them to the executive in charge of the budget procedure, with such recommendations as he may desire to offer. The executive in charge of the budget procedure will forward these to the budget committee (if there is one) which will make any revisions which it may think necessary and return them to the sales managers, who in turn will transmit to each subordinate his budget as approved.

Cement Technology in 1927

Prüssing discovered a method of maintaining the viscosity of the raw slip constant. He found that the oxidation of the iron compounds of the clay affects the viscosity of the slip. Becker found that addition of fluorspar to the raw powder is an advantage, for the sintering temperature is lowered and the hardening of the finished cement is favorably influenced. Bates, of the Bureau of Standards, established the fact that a cement rich in lime may be obtained by reducing the SiO_2 content without changing the iron oxide or alumina content. A part of the alumina may be replaced by iron oxide. In this way cements containing up to 71% CaO may be obtained. An English patent specified the production of a hydraulic hardening cement by calcining a mixture of limestone, ash from zinc retorts and coke at 1,000 degrees C. Another inventor added iron as an oxygen carrier to the cement kiln to accelerate burning. Another discovery produced by mixing calcium chloride with colloidal silica, the mixture compressed and ground. Garre used small quantities of lead oxide as a means of retarding setting. Larger quantities injure the product. An English patent used slag, clinker and anhydrite as raw materials to form a high strength, rapid hardening cement with high lime content. The production of aluminous cements in rotary kilns was covered by several patents. The late Spackman used a mixture of bauxite and alumina. The "Super-Cement" of Goddard, used with great success in England during the war is made in several American plants, using a gallotannin-gypsum compound instead of gypsum alone. Another discovery was the production of aluminous cement at a relatively low temperature (900-1,100 degrees C) with somewhat longer burning period. The basis of a French patent for the production of aluminous cement consists of the use of natural occurring aluminum silicates which were mixed with materials containing lime and additional alumina, and the mixture fused. A cement especially resistant to sea water was made by grinding aluminous cement clinker with blast furnace slag. A rapid hardening strong cement was obtained by heating a mixture of slacked lime, calcium aluminate, aluminum sulphate and magnesium carbonate at low temperatures.

Closed kiln systems were suggested in several variations, Stehmann's being the first. Nashe developed an automatic shaft kiln with waste heat utilizer, in which the fuel and raw meal mixture were sprayed. Two new methods of cooling clinker were suggested.

New methods for the production of porous concrete included the use of glue and gelatine in colloidal solution (in England) and the use of calcium-magnesium alloys in the aggregate. C. R. Platzmann (Zement, May 3, 1928).

QUARRIES ESTABLISH SAFETY RECORDS

ESPECIALLY noteworthy instances of the long-continued operation of large mines and quarries without injuries to employees are revealed in the announcement of the leading participants in the National Safety Competition held during the calendar year 1927 under the auspices of the United States Bureau of Mines, Department of Commerce. A large Michigan iron mine, two non-metallic mineral mines located in Illinois and Ohio and 27 quarries and open-pit mines located in Texas, Kansas, Pennsylvania, California, Alabama, Indiana, New York, Minnesota, Kentucky, Maryland, Ohio and Michigan were operated throughout the year without a single accident involving loss of working time on the part of an employee. Two hundred and fifty-six mines and quarries, representing 31 states, were represented in the contest. The total amount of exposure to hazard was 91,919,812 man-hours. In addressing congratulatory letters to the winning mines or quarries in each group of contestants, Secretary Hoover of the Department of Commerce declared that the achievement represented a definite contribution to the personal welfare of industrial workers and marked a forward step in the elimination of unnecessary accidents in American industry. Commendatory letters were written by Director Scott Turner, of the Bureau of Mines, to the various mines and quarries awarded honorable mention in the contest.

The holding of the National Safety Competition in 1927 marked the third consecutive year of this notable endeavor to reduce, through the medium of friendly competition, the number of personal injuries in the mines and quarries of the United States. Competing companies were grouped into five classes, namely, anthracite mines, bituminous coal mines, metal mines, nonmetallic mineral mines, and quarries and open-pit mines. To the winning company in each group was awarded the bronze trophy Sentinels of Safety, the gift of The Explosive Engineer magazine. The winner in each group was the mine or quarry whose record showed the smallest loss of time from accidents in proportion to the total amount of time worked by all employees.

The competition for the trophy was restricted to mines employing at least 50 men underground and to quarries and open-pit mines employing at least 25 men in the pit.

First place in the anthracite mining group was awarded to the Jeddo-Highland Coal Company's Highland No. 6 mine, at Jeddo, Luzerne County, Pennsylvania. This mine worked 134,680 man-hours in 1927 and had a loss of only 0.119 days per thousand man-hours of exposure.

Honorable mention in the anthracite mining group of contestants was given to the Upper Lehigh mine, of the Hazlebrook Coal Company, Upper Lehigh, Pennsylvania; the Jeddo No. 7 mine, of the Jeddo-Highland Coal Company, Jeddo, Pennsylvania; the Ebervale mine of the Jeddo-Highland Coal Company, Jeddo, Pennsylvania; and the Lawrence mine, of the Harleigh-Brookwood Coal Company, Mahanoy Plane, Pennsylvania.

No. 2 mine of the United States Coal and Coke Company, at Gary, West Virginia, was the leader of the bituminous coal mine group. This mine's record showed 688,937 man-hours worked in 1927 with an accident-severity rate of 0.132 and an accident-frequency rate of 1.5, while the average rates for the whole bituminous group were 15.739 for severity and 97.3 for frequency.

Honorable mention, in the bituminous group, was given the No. 4 mine of the United States Coal and Coke Company, at Thorpe, West Virginia; the Panther mine of the United States Fuel Company, Heiner, Utah; the No. 9 mine of the United States Coal and Coke Company, Filbert West Virginia, and the No. 8 coal mine of the United States Coal and Coke Company, Elbert, West Virginia.

Bristol iron-ore mine at Crystal Falls, Iron County, Michigan, operated by the Bristol Mining Company, won first place in the metal-mine group. The Bristol mine was operated in 1927 without a lost-time accident, although the mine employed about 140 men and worked 434,916 man-hours.

In the metal mine group, honorable mention was given the Lucky Bill lead and zinc mine, of the Federal Mining and Smelting Company, Cardin, Oklahoma; the Berkshire iron-ore mine of the Brule Mining Company, Stambaugh, Michigan; the Armour No. 2 iron-ore mine of the Inland Steel Company, Crosby, Minnesota, and the Lucky Jew zinc and lead mine, of the Eagle-Picher Lead Company, Treece, Kansas.

The best record among mines producing nonmetallic minerals other than coal was established by the Marquette Cement Manufacturing Company at the company's limestone mine at LaSalle, LaSalle County, Illinois. This mine was operated without a lost-time accident in 1927. During the year the employees worked 205,601 man-hours.

Honorable mention, in the nonmetallic mineral mine group, was given the Ironton cement rock mine of the Alpha Portland Cement Company, Ironton, Ohio; the Missouri Portland Cement Company limestone mine, Cement City, Missouri; the Manheim cement rock mine of the Alpha Portland Cement Company, Manheim, West Virginia; and the Southard gypsum mine of the United States Gypsum Company, Southard, Oklahoma.

The leading plant among quarries and open-pit mines was the Mitchell limestone quarry, at

Mitchell, Lawrence County, Indiana, operated by the Lehigh Portland Cement Company. The Mitchell quarry and crusher were operated without a lost-time accident in 1927; its volume of exposure was 308,886 man-hours.

In the quarry and open-pit mine group, honorable mention was given the following contestants:

Ormrod limestone quarry, of the Lehigh Portland Cement Company, Ormrod, Pennsylvania.

Union Bridge limestone quarry, of the Lehigh Portland Cement Company, Union Bridge, Maryland.

Security cement rock quarry, of the North American Cement Corporation, Security, Maryland.

Union Limestone Company quarry, Hillsville, Pennsylvania.

Bath limestone quarry, of the Lehigh Portland Cement Company, Bath, Pennsylvania.

White Haven sandstone quarry, of the General Crushed Stone Company, Whitehaven, Pennsylvania.

Louisville Cement Company cement rock quarry, Speed, Indiana.

Texas Portland Cement Company limestone and shale quarry, Dallas, Texas.

Kansas Portland Cement Company limestone and shale quarry, Bonner Springs, Kansas.

Ash Grove Lime and Portland Cement Company limestone quarry, Chanute, Kansas.

Pennsylvania-Dixie Cement Corporation Plant No. 6 cement rock and limestone quarry, Nazareth, Pennsylvania.

Iola limestone quarry, of the Lehigh Portland Cement Company, Iola, Kansas.

Cowell Portland Cement Company lime rock quarry, Cowell, California.

Alabama Portland Cement Company limestone quarry, Birmingham, Alabama.

Lehigh Lime Company (Mitchell) limestone quarry, Mitchell, Indiana.

Helderberg limestone quarry of the North American Cement Corporation, Howes Cave, New York.

York open-pit iron-ore mine, of the York Iron Mining Company, Nashwauk, Minnesota.

Sandts Eddy limestone quarry of the Lehigh Portland Cement Company, Sandts Eddy, Pennsylvania.

Sandusky Cement Company limestone quarry (silica), Toledo, Ohio.

Wickwire Spencer Steel Company limestone quarry, Gasport, New York.

Pennsylvania-Dixie Cement Corporation Plant No. 4 cement rock quarry, Nazareth, Pennsylvania.

Olive Hill Limestone Company crushed limestone quarry, Olive Hill, Kentucky.

Martins Creek No. 3 cement rock quarry, of the Alpha Portland Cement Company, Martins Creek, Pennsylvania.

Alabama Portland Cement Company shale quarry, Birmingham, Alabama.

Bellevue cement rock quarry, of the Alpha Portland Cement Company, Bellevue, Michigan.

Consolodiated Cement Corporation limestone quarry, Mildred, Kansas.

The records of the National Safety Competition of 1927 again demonstrated the fact that most mining and quarrying companies are succeeding in their efforts to prevent accidents of their employees, the Bureau of Mines points out. This is indicated by the records which showed that a majority of the companies had accident-severity rates lower, and therefore better, than the average rates for their respective groups.

Organize To Standardize Construction of City Streets

A City Officials' Division of the American Road Builders' Association will be organized at a meeting called for that purpose on June 8. The division will be devoted principally to the standardization of city street construction, operation and maintenance methods.

According to the association, millions of dollars can be saved the cities annually by the standardization of these methods. Examples were cited where the use of economical methods have reduced the cost of street construction in many instances by as much as 50 per cent.

The great concentration of traffic in city areas makes a careful and thorough handling of city street affairs a matter of extreme importance.

The new division will operate by means of committees selected from the leading city officials of the country. These committees will study the various problems of city street construction, maintenance and operation and will report their findings at the 1929 Convention and Road Show of the American Road Builders' Association. A special day will be set aside at this great annual convention for the discussion of city street affairs. Approximately 30,000 road builders will attend.

According to the association, approximately $400,000,000 annually is spent on city streets, or a sum equal to more than one-third of the annual construction and maintenance costs of the entire state and rural highway systems of the United States.

There are 3,001,825 miles of roads in the United States, according to the American Road Builders' Association. On January 1st, 1928, approximately 666,000 miles had been improved to some degree.

SIMPLIFIED PRACTICE ACHIEVEMENTS IN THE BUILDING AND CONSTRUCTION FIELD

Ray M. Hudson,
Assistant Director, Commercial Standards Group, Bureau of Standards

HIGH standards of living enjoyed by the American people are the results of steadily mounting per capita productivity. Further advances in these standards must be brought about by improving methods and processes, through the elimination of waste in materials and motion in our production and distribution system.

Just as twenty years ago we undertook nation-wide conservation of our natural resources, so today we must even more vigorously sustain this campaign for a better utilization of our industrial resources and effort. Wastes in commerce and industry fall into a number of classes. While they are of immediate concern to the manufacturing concerns, business community, construction engineers, the interests of the general public are involved to an important degree.

In 1921 when the "Hoover Committee on the Elimination of Waste in Industry" made a survey of six of our major industries, it found that the building industry stood in fourth place, with 53 per cent waste. Thirty-four per cent was chargeable to management, and one of the major causes was lack of simplification and standardization in materials, methods, machinery, and so on. When it is remembered that five billions of dollars are spent annually in construction, some conception may be gained of the extent to which this loss reduces the country's income.

Manufacturers and business men are forced to look into their businesses more intensively than ever before for opportunities to cut down costs and yet maintain for themselves a fair profit. They are finding that a prolific source of waste is too much variety. A surprising proportion of this variety is made up of slight dimensional differences, of models and types which are not markedly dissimilar, but which were originated in an effort to be "just a little different."

Variety may be the spice of life, but when carried to excess in some directions it places an unnecessary burden on manufacturers and distributors and their customers as well. As a result of meaningless differences, many of these "different" articles are slow-moving, and often become "frozen investment." Such funds do not serve a useful purpose, and someone has to pay for this idle capital.

The Department of Commerce, through the Division of Simplified Practice, is assisting the building and construction industry to check this waste, through the reduction of unnecessary variety in sizes and dimensions and other immaterial differences in every-day commodities. This co-operation on the part of the Government contains nothing regulatory nor inquisitorial. The service is to help such industrial groups as are interested in reducing waste, to get the facts as to wastes and to put their corrective actions into practice.

Safeguards have been set up to protect the fullest development of individual initiative and invention, as well as care for the changing trends of business. This is done by providing that the simplified practice recommendations, developed under the auspices of the Division of Simplified Practice, shall be subject to review at the end of such period as may be fixed by the industry. The resurvey is conducted by a standing committee representative of all factors in the industry, or through another general conference of producers, distributors and organized users.

Acceptance by manufacturers, distributors and organized users, representing 80 per cent of the total volume of the industry, is necessary before a program can be published as part of the elimination of waste series of the Department of Commerce.

At the time a simplification is promulgated by a general conference of all interests, a standing committee is appointed by the conference to insure the promotion and observance of the completed project. The membership of the committee is truly representative of all phases of the industry, since it consists of representative manufacturers, distributors, and organized users of the commodity concerned.

The percentages of reduction in variety have been startling, especially in the application of simplified practice in the building and construction field. They are as follows:

S.P. R.	Items	Reductions From	To	Pctg.
1	Vitrified paving brick	66	5	92
3	Metal Lath	125	24	81
4	Asphalt	102	10	90
6	Files and rasps	1,351	475	65
7	Rough and smooth face brick	75	2	97
	Common brick	44	1	98
8	Range boilers	130	13	90
12	Hollow building tile	36	20	44
13	Structural slates for plumbing and sanitary purposes	827	138	83
14	Roofing slates (descriptive terms, thicknesses and sizes).	98	48	51
16	Lumber	Standard nomenclature grades and sizes for softwood lumber.		
17	Forged tools (tool heads)	665	361	46
	Eye sizes	120	10	91
18	Builders hardware (items)	6,948	5,130	26
	Finishes	100	29	71

19	Asbestos mill board (sizes, thicknesses)	21	4	81
	Asbestos paper (sizes, widths, and weights of rolls)	72	16	78
21	Brass lavatory and sink traps.	1,114	76	93
25	Hot water storage tanks	120	14	88
26	Steel reinforcing bars cross-sectional areas	32	11	66
28	Sheet steel	1,819	261	85
29	Eaves trough and conductor pipe	21	16	24
30	Terne plate (weights)	9	7	22
32	Concrete building units (length, width and height of blocks, tile and brick)	115	14	88
38	Sand lime brick (length, width and height)	14	3	79
43	Paint and varnish brushes	480	143	70
45	Grinding wheels	715,200	254,400	64
47	Cut tacks and small cut nails (sizes)	421	182	57
	Packing weights	423	121	71
48	Shovels, spades and scoops	5,136	2,178	57
49	Sidewalk lights (styles)	80	5	94
	Sizes	120	6	95
	Shapes	10	2	80
51	Die head chasers	.....	.....	75
52	Staple vitreous china plumbing fixtures	441	58	87
53	Steel reinforcing spirals	7	4	43
57	Wrought-iron and wrought-steel pipe, valves and pipe fittings. Sizes of valves and fittings	20,000	19,238	4
	Sizes of pipe	62	49	21
61	White glazed tile and unglazed ceramic mosaic	Shapes, patterns, dimensions, grade nomenclature, grade marks, grade specifications and certifications of grades.		
71	Turnbuckles	248	115	54
72	Solid section steel windows	42,877	2,244	95
76	Ash handles (grades)	.....	3	.....
77	Hickory handles (grades)	.....	11	.....
82	Hollow metal doors	Provides for stock items.		
83	Kalamein doors	Provides for stock items.		
87	Forms for concrete ribbed floor construction (widths)	7	2	71
90	Hack saw blades	108	52	53

That simplification yields benefits sufficient to attract manufacturers, distributors and organized users alike, is demonstrated in the high degree of adherence shown the completed recommendations. The success or failure of a simplified practice recommendation is shown in the degree of adherence accorded it by its acceptors. Each recommendation is reviewed annually by a standing committee, which conducts a survey to ascertain the average degree of adherence to the particular program. Whenever it is impracticable to make a factual survey, the committee renders an estimated degree of adherence that the program enjoyed during the period of activity. The committee also makes recommendation for any revision or modification that may be considered necessary.

During the first quarter of 1928 there were 8 projects submitted to the respective standing committee for consideration. Of this number 2 were revised and 6 reaffirmed. The average degree of adherence to these 8 projcts was 89.18 per cent, based on factual surveys. Fifteen projects were reviewed during 1927 of which the average degree of adherence was 82.61 per cent.

Further evidence that simplification is proving of real value to manufacturers and purchasers is found in the increased number of Trade Associations accepting the completed recommendations. During the first quarter of 1928 this increased by 5 per cent, bringing the total to 859, while individual acceptances increased 11 per cent, making this total 8,597.

A major contribution to the stability and prosperity of American business is reflected in the savings which industry has gained from simplification. Industrial leaders estimate these aggregate more than $500,000,000 a year. Typical annual savings due to elimination of unnecessary variety in sizes and dimensions of commonplace commodities are as follows:

Items	Estimated Annual Savings
Paving bricks	$1,000,000
Steel sheets	2,400,000
Reinforcing bars	4,500,000
Range boilers	5,500,000

Elimination of 60 per cent of variety in sizes of softwood yard lumber is estimated to have reduced inventories formerly carried by four billion board feet, thus releasing some $200,000,000 of relatively idle capital. Strict adherence to this lumber simplification assures the home builders of the country the production and distribution of standard dimension lumber supported by the united interests of the industry. During the past year, the lumber simplification program was given greater impetus through the development of grade-marking for cut lumber.

American Road Builders Accept Invitation To Mexico Congress

The American Road Builders' Association has accepted an invitation of the Mexican Federal Highway Commission and Government to participate in the Second National Highway Congress and Exposition to be held in Mexico City on October 3-4-5-6.

The invitation to the association comes from Mexico after that country has completed its third year of Federal road construction and on the eve of a large highway construction program that will be participated in by all the Mexican states and cities as well as the Federal Government.

Invitations have also been sent to South and Central American countries to take part in this Congress, and it is expected that delegations will be present from all Pan American countries.

One of the first objectives of the Mexican Government is to complete the highway from the United States border to Mexico City, a distance of about 800 miles.

CEMENT AND CONCRETE PROBLEMS

By Ingenieur Viktor Bährner*

THE interdependence between the strengths of cement and concrete, the values of their relative strengths at various ages and other relations—in a word, the problem of being able to forecast the strength characteristics of concrete in a simple manner—has existed since the existence of concrete itself. In general, to be able to determine these properties exactly is probably not possible, due to the large number of integrating factors which commonly influence the true strength. The various formulas which exist for this purpose are more or less approximate. It is possible to calculate the actual values for certain given ideal cases and for certain types of cement. To classify and to investigate all these different relations, and to obtain therefrom a straight line relationship is a reasonably difficult matter. Following are a few considerations of interest in this field, offered with the idea of simplifying the problem.

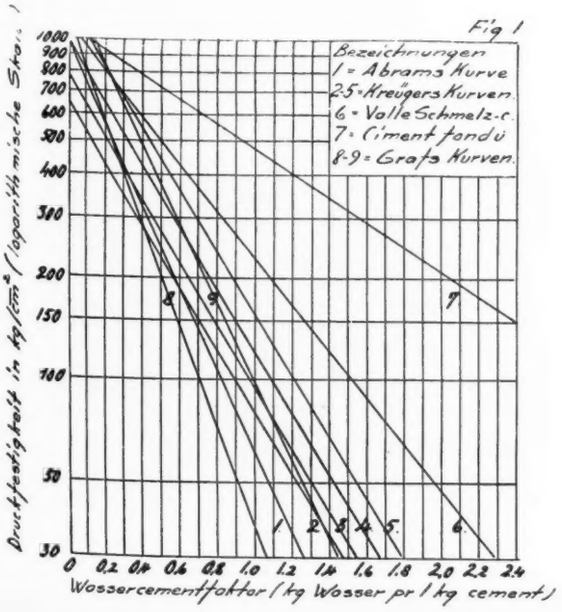
Various Water-Cement Ratios

It has been shown that the compressive strength of concrete may be determined within certain limits by means of the aforementioned water-cement ratio, that is, the ratio between the water entering the concrete and the cement, expressed in parts by weight or by volume.

$$\frac{\text{Weight of water}}{\text{Weight of cement}} \quad \text{or} \quad \frac{\text{Volume of water}}{\text{Volume of cement}}$$

This theory was advanced by the American, Professor Abrams. In Sweden, too, Profs. Forsell and Kreüger made corresponding investigations and those results are available in "Mitteilung Nr. 1 von der bautechnischen Institution der Kgl. Technischen Hochschule" and "Beton Nr. 1, 1927."

*From "Zement."



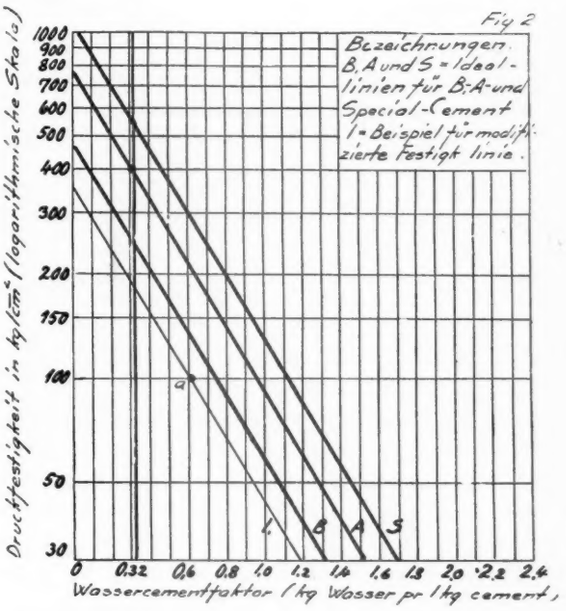


Fig 2
Bezeichnungen
B, A und S = Ideal-linien für B:A- und Special-Cement
1 = Beispiel für modifizierte Festigk linie.
Druckfestigkeit in kg/cm² (logarithmische Skala)
Wassercementfaktor (kg Wasser pr 1 kg cement)

If these curves are plotted graphically in a system where the ordinates are logarithms of the compressive strength of the concrete, and the abscissa, the water-cement factor, the curves become either completely or approximately straight lines.

Abrams' curve which refers to concrete made from ordinary American Portland cement, is shown in Line 1, Fig. 1. Kreüger's curves, which refer to concrete made from Swedish Portland cement, are shown in the parallel lines 2-5. Forsell's curve referring to concrete made from "Valle" fused cement shows a noticeable deviation from the slant of the first lines, Line 6. Line 7 represents

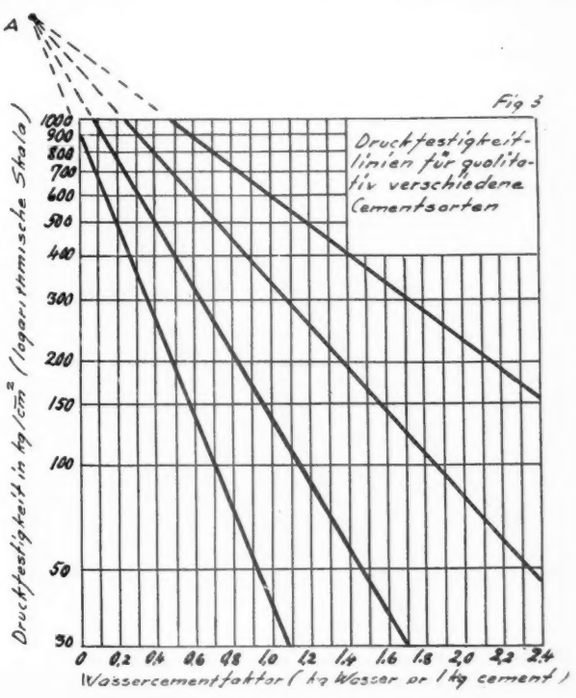
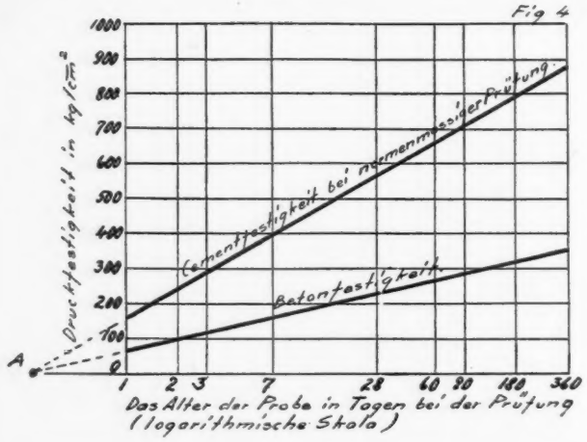
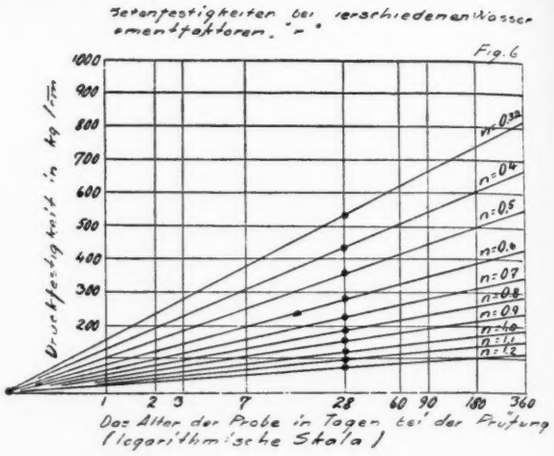


Fig 3
Druckfestigkeitlinien für qualitativ verschiedene Cementsorten
Druckfestigkeit in kg/cm² (logarithmische Skala)
Wassercementfaktor (kg Wasser pr 1 kg cement)





the series of investigations made with French aluminous cement "Ciment Fondu," according to "Mitteilung No. 2" of the source mentioned above. Lines 8-9 illustrate the limiting curves of Graf for concrete strength, according to "Der Aufbau der Mörtels im Beton," p. 29.

Lines 2-6, which represent all the various grades of Swedish cements and show as their inclination illustrates, relatively good agreement among themselves, and if the original value is taken as the starting point, for line 6, then this line will also approach parallelism with lines 2-5.

By more detailed investigation of these lines and the various kinds of cement which they represent, it is found that, the mean compressive strengths of various cements, during 28 days combined hardening, and tested under standard conditions, lie close to each point where the line of the ordinate cuts the water-cement factor at 0.32. Also, it follows that if the mean strength value after 28 days combined hardening is placed upon the ordinate 0.32, and a line drawn in the direction determined, it is possible to obtain the "ideal concrete line" in very simple fashion, without any mathematical calculation.

Figure 2 was made in this manner showing graphically the "ideal concrete line" for Swedish B-Cement, A-Cement and Special Cement, which corresponds exactly to Kreüger's curve and is transformed into straight lines. All these, and corresponding lines illustrate the crushing strength of concrete produced from good concrete materials in controlled work procedures and of a measured consistence.

All other varieties of sand and gravel, each different gradation and different proportion, etc., gives different strength results. For this reason, this "ideal line" must be used with caution, and above all, under careful control. This control, in its simplest form consists of preparing several concrete cubes from the raw materials and with known water-cement factor, and then crushing them. If the "ideal line" for the used cement represents, for example, line B in Figure 2, the concrete strength obtained by following a few measured gradations of aggregate, no higher value is obtained than a point *a*, then the strength line of the concrete in question is shown by line *1*, which is made to run parallel to line *b* through point *a*.

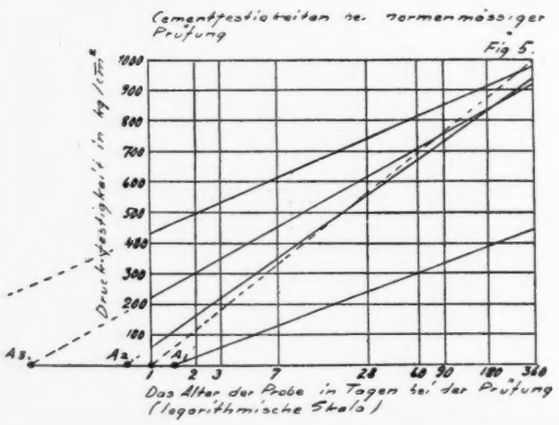
The general formula for this line is

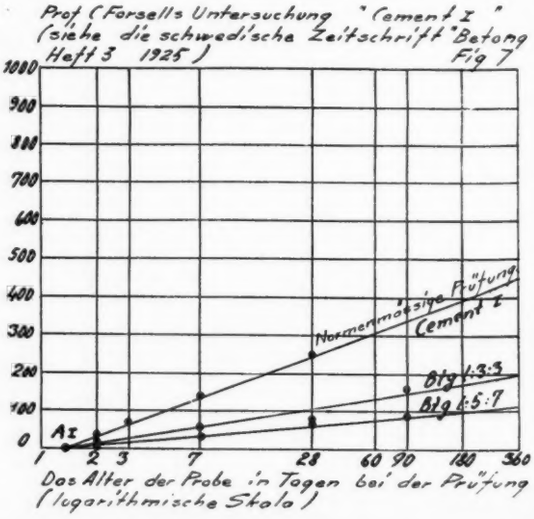
$$\log K_b = C\,(a - n)$$

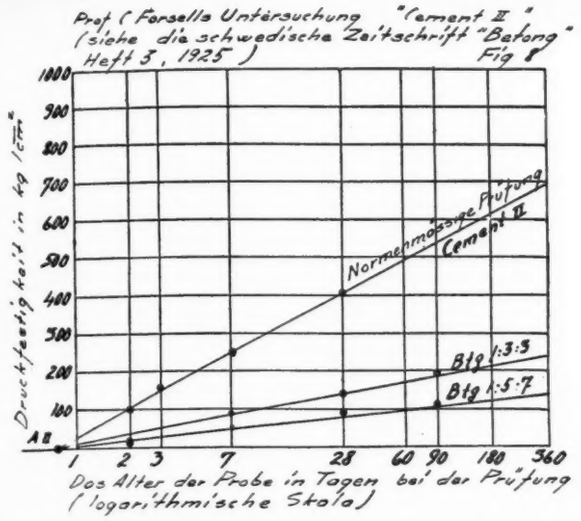
where K_b=the crushing strength of concrete in kg/cm² after 28 days,

C and *a*=constants

n=the water-cement factor.


Cementfestigkeiten bei normenmässiger Prüfung
Fig 5.
Druckfestigkeit in kg/cm²
Das Alter der Probe in Tagen bei der Prüfung
(logarithmische Skala)





For B-Cement, A-Cement and Special Cement the values found were:

Kind of Cement		Constants		Strength of Concrete
Class	kg/cm²	C	a	log K_b
B	250	0.9	2.98	0.9 (2.98 - n)
A	400	0.9	3.21	0.9 (3.21 - n)
Special	500	0.9	3.36	0.9 (3.36 - n)

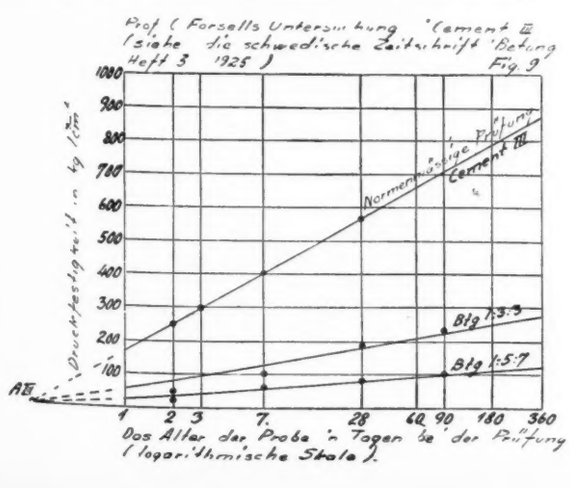
These parallel lines give a completely practical approximation for the "ideal strength lines" of concrete when using Swedish cements. That this is still not generally true is shown by the curve for the French aluminous cement, and others.

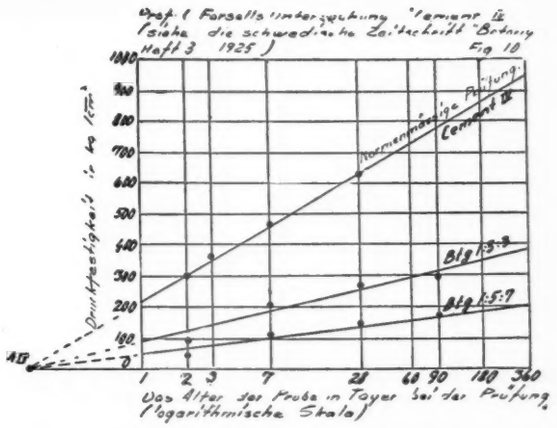
If the real strength values for the various series investigated are plotted, there is shown, without doubt (see Figure 3), a tendency to approach a point A, but the greater probability is that each variety of cement has its own characteristic curve independent of all the others.

Until something better has been found, these parallel lines are to be preferred in practice on account of their simplicity, and in the absence of a satisfactory alternative.

Comprehensive Strength of Concrete Cubes at Various Ages

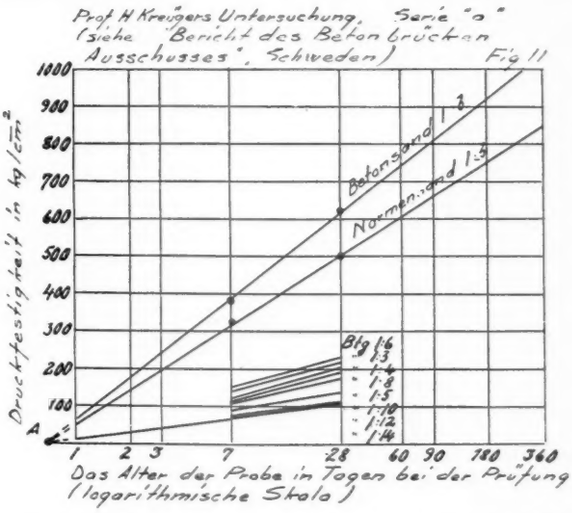
The increase in concrete strength with the age of the concrete is different for each variety of cement. Formulae for the estimation of this increase exist in large quantity and can safely be



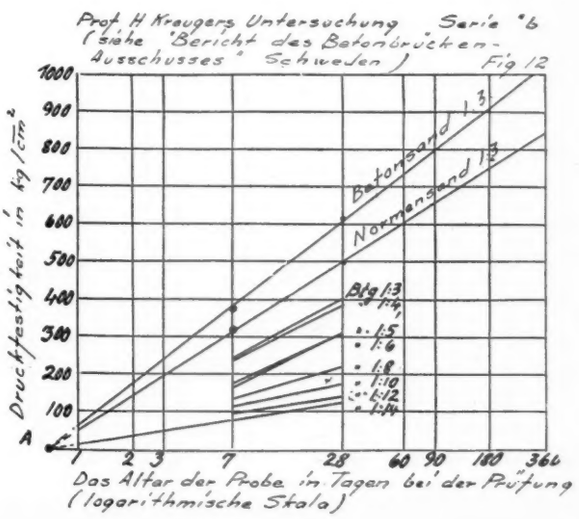


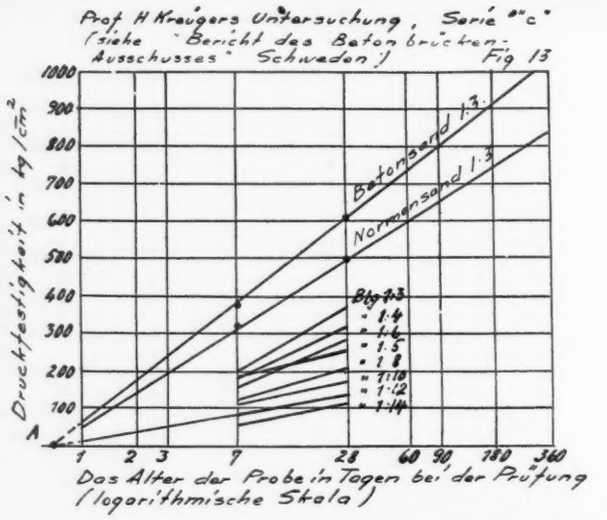
used for the particular cement for which the formula was developed, but for general use none of them can be considered valid.

If the crushing strength for a variety of cements is plotted graphically, the time being shown in logarithmic scale, straight lines are obtained, whose extensions meet in point A. (See Figure 4.) The compressive strength for 7 days shows



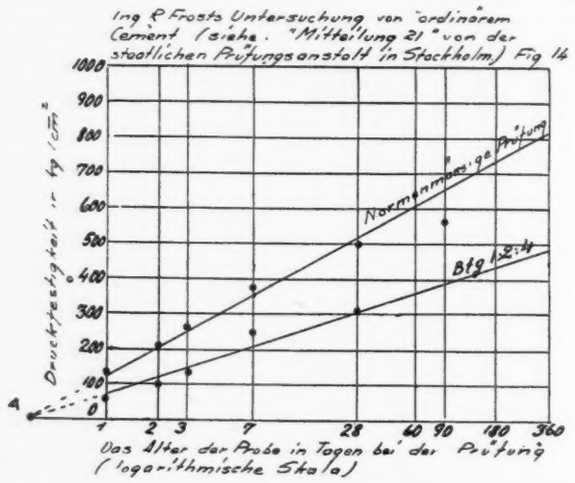
the effect of water curing, for 28 days and thereafter the results for cerubined curing. If the crushing strengths for concrete made from this cement are plotted against time, in similar fashion,





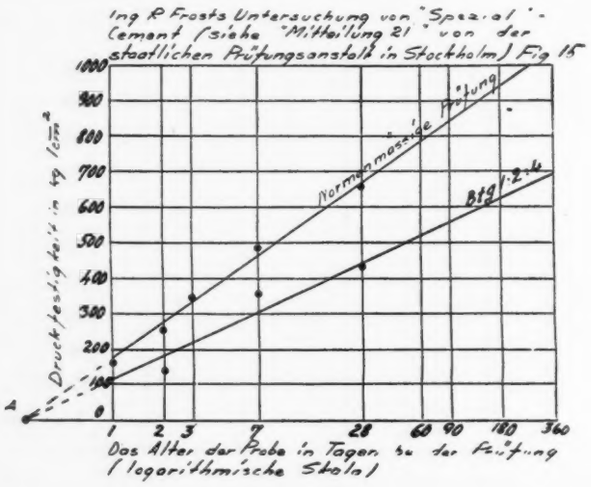
this also results very nearly in a straight line which also can be extended to meet at point A.

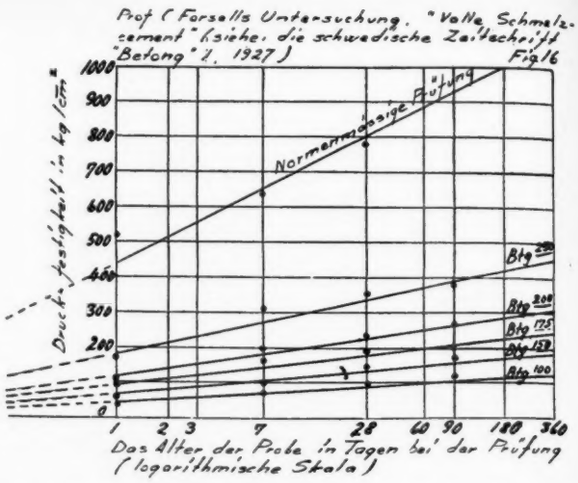
For different varieties of cement, the point A lies at different, but definite places on the base line (see Figure 5) and in each case investigated it has


Ing. R. Frosts Untersuchung von "ordinärem Cement (siehe "Mitteilung 21" von der staatlichen Prüfungsanstalt in Stockholm) Fig 14
Normenmässige Prüfung
Btg 1:2:4
Druckfestigkeit in kg/cm²
Das Alter der Probe in Tagen bei der Prüfung
(logarithmische Skala)

been shown that the lines for the corresponding concrete strengths, also tend upon extension to reach the same point.

In considering this point it is evident that it is also possible to estimate the concrete strength


Ing. R. Frosts Untersuchung von "Spezial"-Cement (siehe "Mitteilung 21" von der staatlichen Prüfungsanstalt in Stockholm) Fig 15
Normenmässige Prüfung
Btg 1:2:4
Druckfestigkeit in kg/cm²
Das Alter der Probe in Tagen bei der Prüfung
(logarithmische Skala)


Prof. C. Forsells Untersuchung. "Valla Schmelz-cement" (siehe die schwedische Zeitschrift "Betong" 1. 1927) Fig 16
Normenmässige Prüfung
Btg 250
Btg 200
Btg 175
Btg 150
Btg 100
Druckfestigkeit in kg/cm²
Das Alter der Probe in Tagen bei der Prüfung
(logarithmische Skala)

from the point A for each variety of cement, hardened under known conditions of curing, time and the water-cement factor. Figure 6 shows the concrete strengths by the use made of the 28-day ordinates of the water-cement factor shown in Figure 2, for the corresponding cement varieties.

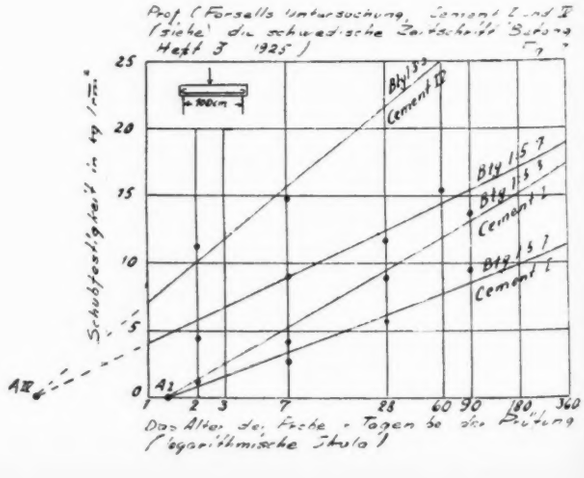
English results on the increase of compressive strength with age, expressed in per cent of the strength of a test piece one year old, are as follows:

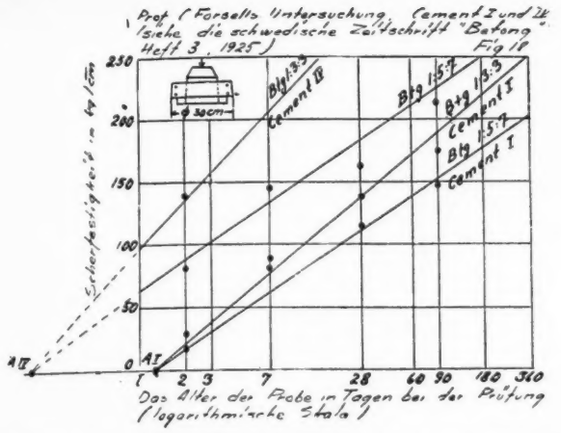
1 year	100 per cent.
6 months	95 per cent.
4 months	90 per cent.
3 months	85 per cent.
2 months	75 per cent.
28 days	60 per cent.

These values are naturally only approximate, but if they are compared with the line in Figure 5, which starts from 0 at one day and reaches 1,000 at 360, a good agreement is obtained with the values of this line at various ages.

In the following, a part of the results of Swedish investigations will be incorporated, with the view of demonstrating by this comparison the agreement between this method and the actual test results.

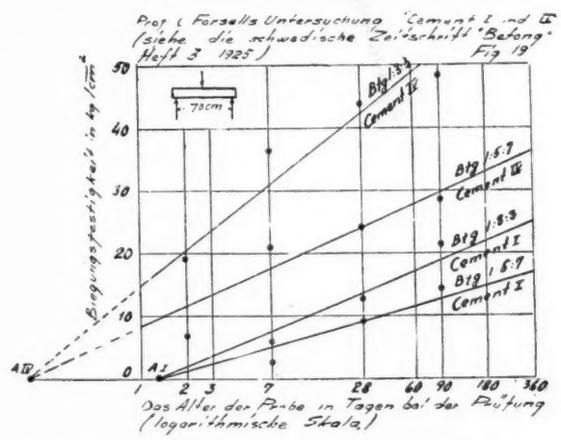
All this series of investigation were made with reference to the compressive strength of concrete. Exactly the same method of consideration concern-


Prof. C. Forsells Untersuchung. Cement I und II (siehe die schwedische Zeitschrift "Betong" Heft 3 1925)
Btg 1:3
Cement II
Btg 1:5
Cement I
Schubfestigkeit in kg/cm²
Das Alter der Probe in Tagen bei der Prüfung
(logarithmische Skala)



ing the usual strength characteristic of concrete, as an amount of subsequent testing shows.

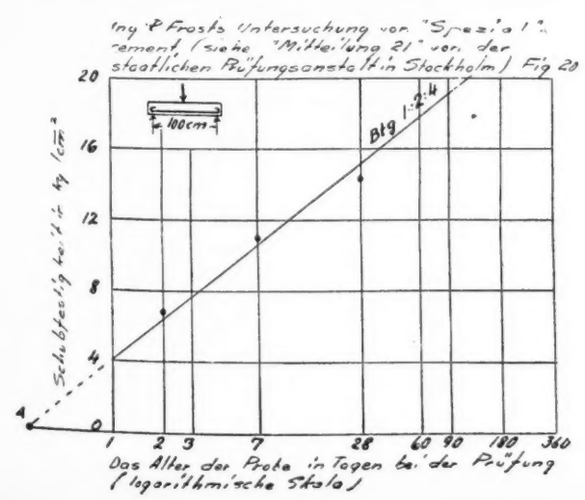
Figures 17-20 show, in order to clarify this statement, a series of investigations (see also figure 7, 10 and 15) like the previous, that the thrusting, bending and shearing strengths very nearly exhibit straight line relationships, in full agreement with the compressive strength lines; and it is to be



noticed that the point A toward which the lines extend is exactly the same as for the crushing strength lines of the corresponding cements.

This Point A seems also, so far as the results go of the test series made, to determine theoretically the total strength characteristic of the concrete.

In similarity with the compressive strength, the


Ing. Frosts Untersuchung von "Spezial"-
cement (siehe "Mitteilung 21" von der
staatlichen Prüfungsanstalt in Stockholm) Fig 20
Btg 1:2:4
Schubfestigkeit in kg/cm²
Das Alter der Probe in Tagen bei der Prüfung
(logarithmische Skala)

values of the ordinates at 28 days, the "ideal compressive strength," are given by the cements with various water-cement ratios. In the same way the ideal lines of the cements for the thrusting, bending and shearing strengths with various water-cement factors can be plotted in corresponding fashion, if sufficient data for this purpose were at hand.

The foregoing described methods, to determine graphically the strength characteristics of concrete at will, must be considered, like all similar methods, merely an attempt to illustrate the problem and to approach nearer to its solution.

There are not sufficiently comprehensive control investigations extant for an exact judgment of the method described here, but because of its simple practical application and the comparatively good agreement with hitherto available tests, it is published with the belief that it is of certain interest and that the matter will contribute to the knowledge and closer valuation of the subject.

Flooding Aluminous Cement

Cement particles suspend easily in the water of a space between pieces of aggregate to form practically a uniform suspension at the time of pouring. With a large excess of water present, however, the cement sinks to the bottom of the void before setting, leaving the water excess to fill the balance of the space. When this excess water evaporates, an air space is left which weakens the concrete. The concrete (or mortar) thus formed is very porous, pervious to water, absorbs water easily and only slightly resistant to chemical and physical influences. The influence of atmospheric carbon dioxide, or of the same gas in solution in mineral waters. A water containing calcium carbonate (super saturated) calcium bicarbonate and free CO_2 showed no difference in strengths of the concrete formed than when distilled water was used. It is concluded that (1) aluminous cement, ad mortars and concretes made with it may also be "flooded," similarly to ordinary Portland; and (2) Carbonic acid, either in the air or water used in mortars and concretes does not hinder their hardening or acquisition of strength. H. Vierheller. (Tonindustrie-Zeitung, April 14, 1928.)

An International Construction Congress

The French association of masonry and cement contractors are holding, in Paris, from May 21 to May 25, an international congress for the exchange of ideas on masonry and reinforced concrete construction, according to Commercial Attache H. C. McLean, Paris. As there will undoubtedly be a report on the more important exhibits and discussions, it is suggested that any interested American firms request copies from the "Chambre Syndicate.

VIBRATING SCREENS IN THE PIT AND QUARRY INDUSTRIES

By H. W. Munday

Part Two

PART ONE of this article appeared in the May 23 issue. Several vibrating screens were described including W. S. Tyler Company's "Hum-mer" screen, Niagara Concrete Mixer Company's "Niagara" Screen, Universal Vibrator Company's "Universal" screen, Traylor Vibrator Company's "Screen Supreme," Roberts and Schaefer Company's "Arms" screen, Deister Concentrator Company's "Leahy" screen, Sturtevant Mill Company's "Moto Vibro" screen and Pittsburgh Coal Washer Company's "Pittsburgh" screen. Other types of screens are to be discussed here.

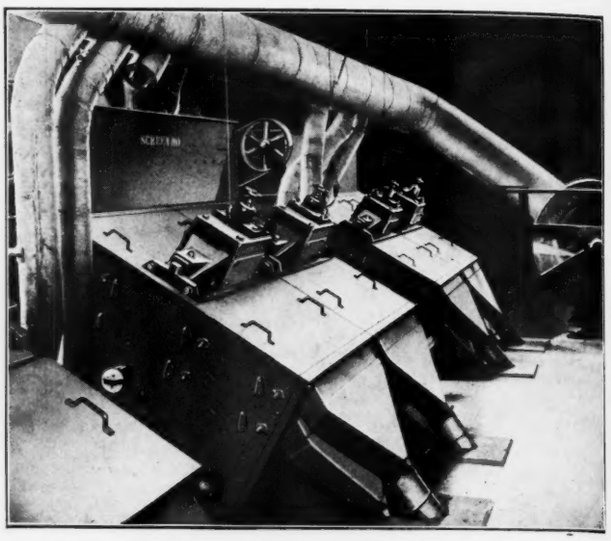
The Orville Simpson "Rotex" screen is a combination vibratory and shaker screen. This screen has a gyratory motion in a horizontal plane applied at one end while the other end is pivoted. The motion varies from a 3½ inch diameter circle at the feed end to an egg shape at the center and then almost a straight line reciprocating motion at the discharge end.

The shaking motion is given to the entire screen cloth frame at the rate of 210 gyrations per minute by a totally enclosed oil immersed ball bearing eccentric and mitre tranmission belt driver. The vibrating motion is perpendicular to the cloth and is produced in the cloth by the striking of solid rubber balls which are confined beneath the screen cloth in cage compartments. The impact of the rubber balls is accompanied by alternate compression and suction between the balls and the cloth which serve to keep the screen cloth from blinding.

The balls roll when the screen frame is set in motion, first to one end of their compartment and then to the other striking beveled partition bars from which they bounce up striking the under side of the screen cloth. Balls 1⅛, 1⅜ and 3½ inches are used. The smallest size is for delicate screen cloths while the largest are for the heavy screens with openings up to 1¼ inches.

The Rotex screen is made in single, double and triple deck units. From 1 to 4 h.p. is required according to the weight, coarseness and load of material to be handled. The screen slope is usually four degrees although this can be changed. The long travel and the sliding scrubbing action are claimed by the manufacturers as advantages for handling wet material.

Simplicity Engineering Company's "Super" vibrating screen has a rotary vibratory motion imparted to the entire screen cloth frame by means of eccentrics mounted on two shafts geared in



A Dust Proof Hummer Installation in a Crushed Stone Plant

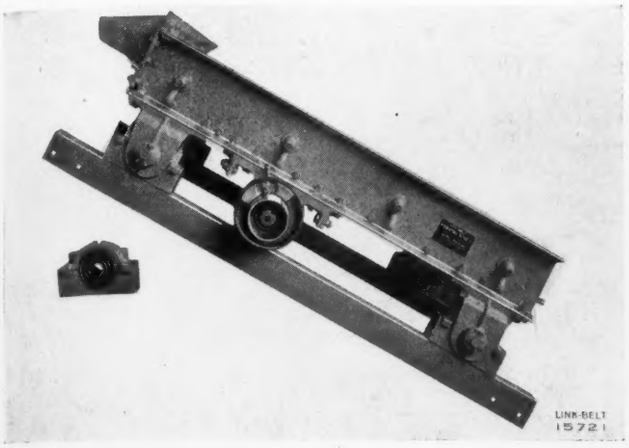
common and running in dust tight ball bearings. The motion is one of oscillation which vibrates the screen both horizontally and vertically. The eccentrics are counterbalanced to eliminate vibration in the main frame.

The screen has the same action and same throw at allspeeds and over the entire screen cloth. The drive shaft and the eccentric shafts are of large size. Drive may be either by belt or direct connected motor. This screen is built in single, double and triple deck units and is recommended by the manufacturers for screening material either wet or dry up to 5 inches.

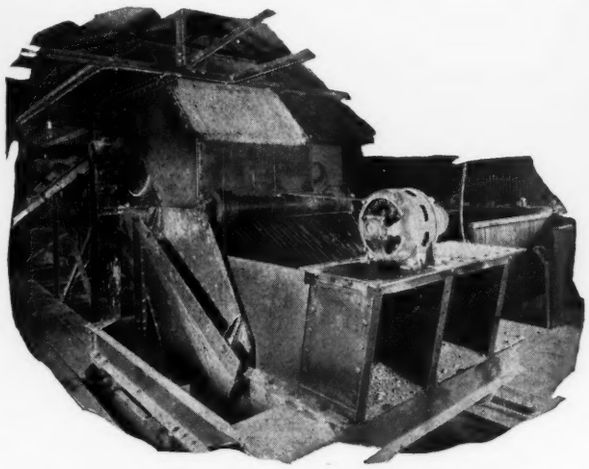
The Norwood Engineering Company's "James" screen has a horizontal reciprocating vibratory motion imparted to the entire screen cloth by means of a totally enclosed oil immersed motor driven bumper. The vibrator mechanism consists of three moving parts, that is, a gyratory arm operates against a heavy piston which in turn transmits the shock through a small anvil to a wooden cross member connecting the hanger bars which carry the screen frame. This ram gyrates at 300 r.p.m. and with its six steel sockets delivers 1800 horizontal hammer blows per minute to the upper side of the inclined screen cloth frame.

The screen frame is suspended by four flexible steel hangers. The screen frames are built in sections which are interchangeable every six square feet of screening surface. The James screen is built in single and double deck units. It can be operated either by motor direct or from line shaft.

C. W. Hunt Company's "Mitchell" screen is an



Link Belt Vibrating Screen



Robins "Vibrex" Screen Fitted Out With Grizzly Bars in the Plant of The Crossman Sand Company

electrical vibrating screen imparting to the entire cloth a circular upward and downward motion accompanied by a sidewise sifting motion at the same time. The planes of action of these motions are constantly changing. The material tends to travel across and up the screen cloth but is forced down by gravity.

The amplitude of vibration is very small being less than $\frac{1}{16}$ inch diameter. The force applied to vibrate the screen is about 2,600 pounds centrifugal force in the standard screen. The speed of vibration is 60 times per second. The incline angle can be varied from 25 to 45 degrees. From ¾ h.p. up is required depending upon the character of material and load.

The Link Belt vibrating screen has a rotary vibratory motion imparted to the entire screen cloth frame by means of adjustable unbalanced revolving counter weights which are mounted on a belt driven shaft running in dust tight ball bearings at 1,800 r.p.m.

The counterweights are made sectional to produce varying intensities of vibration. They are located in safety chambers and are easily accessible for quick changes. When once fixed, the vibrations are constant. The cloth frame is supported on four flat spiral springs and the cloth is intended to whip.

Niagara Vibrating Screen in Valley Sand and Gravel Company Plant in New York State

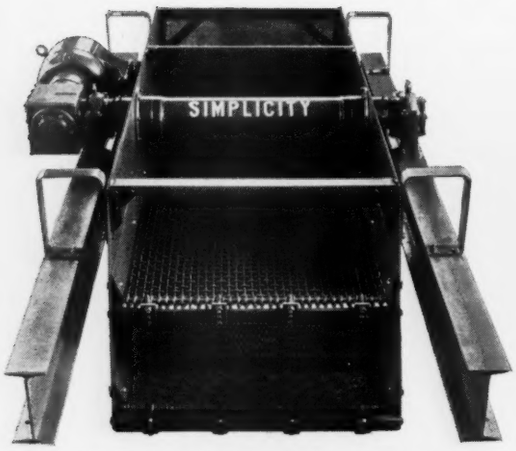
The Link Belt screen is built in single or double deck units and is recommended by the manufacturers for material up to ¾ inches but it will handle material up to 2½ inches.

The Robins Conveying Belt Company's "Vibrex" screen has a rotary vibrating motion imparted to the entire screen cloth by means of adjustable unbalanced revolving weights which are mounted on a belt driven shaft running in heavy dust tight Timken roller bearings at 1800 r.p.m. The vibration is forward and rotary.

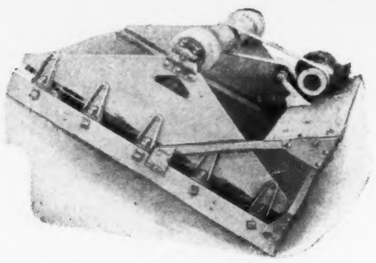
Ten adjustable shock absorbing supporting springs carry the live frame and also maintain constant automatic tension in the screen cloth. The amplitude of vibration is readily adjusted on the job for the particular condition.

A steel angle which is attached through cross rods to the live frame supports the screen cloth along its center line. It permits drum head tension and tends to distribute the material evenly over the entire screen surface when the center line of the screen is raised.

The Cottrell Engineering Company's "Slugger" screen imparts motion to the entire screen cloth frame by means of adjustable eccentrics and hammers. Both head and eccentric shafts are mounted on dust proof Hyatt roller bearings. The vibrations are applied from the underside of the screen. A shaft speed for average installations varies from



Simplicity Engineering Company's "Super" Screen



Robin "Vibrex" Screen

300 to 450 r.p.m. but this speed can be increased to 750 r.p.m. The rocker shafts which carry the hammers are of high grade steel and are carried in heavy bearings fitted with grease cups. The steel arms operating these shafts are connected to the eccentric by means of reinforced rubber. The "Slugger" screen is built in single, double and triple units.

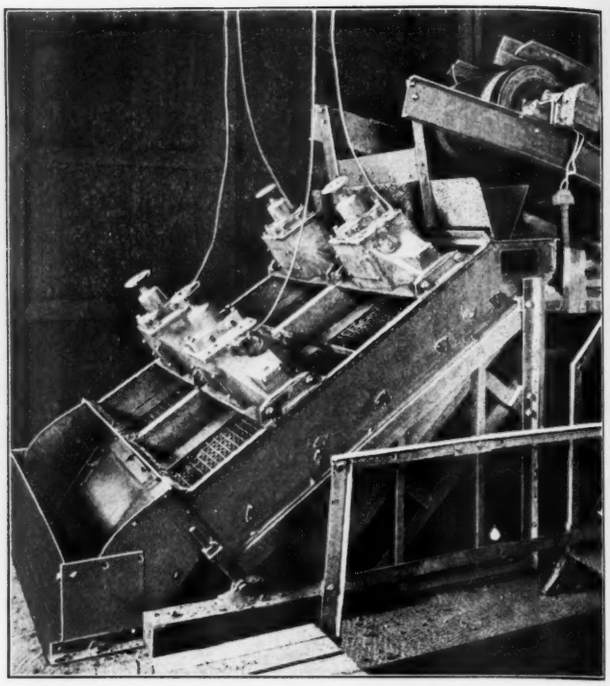
Fifteen different vibrating screens have been discussed. These screens represent practically all the vibrating screen units installed in the pit and quarry industries.

Some of the manufacturers mentioned build other types of vibrating screens. This is illustrated in the case of Robins Conveying Belt Company. Vibrating screens are also built by other companies such as Smith Engineering Works, Gallard and Henning, etc. We have discussed here the majority of the vibrating screens and mention in one or two cases was omitted because of insufficient data or because of radical changes being made in the present unit.

The screens discussed may be grouped into the following tabular classification suggested by D. W. Yambert of the France Stone Company.

I. Electric Vibrating Screens:
   (a) C. W. Hunt Company's "Mitchell."
   (b) Traylor Engineering Company's "Screen Supreme."
   (c) W. S. Tyler Company's "Hum-mer."

II. Positive Throw Eccentric Vibrating Screens:
   (a) Niagara Concrete Mixer Company's "Niagara."



Tandem Installation of Hum-mer Screens in a Slag Plant

   (b) Pittsburgh Coal Washer Company's "Pittsburgh."
   (c) Simplicity Engineering Company's "Super."
   (d) Sturtevand Mill Company's" Moto Vibro."
   (e) Cottrell Engineering Company's "Slugger."
   (f) Roberts and Schaefer Company's" Arms."

III. Rotating Unbalanced Weights Vibrating Screens:
   (a) Link Belt Company's vibrating screen.
   (b) Robins Conveying Belt Company's screen.

IV. Cam or Bumper Vibrating Screen:
   (a) Deister Concentrator Company's 'Leahy."
   (b) Norwood Engineering Company's "James."
   (c) Orville and Simpson Company's "Rotex."

A thorough study of the sand and gravel industry reveals the fact that vibrating screens have demonstrated economics to such an extent that they are a fixed item in the larger proportion of sand and gravel plants. Their application in the sand and gravel will be even extended because these screens can be used with satisfaction on all sizes from 2½ inches down to $\frac{3}{16}$. In the crushed stone industry vibrating screens will be used more generally in the next year or two. These screens have been installed in a large number of plants and are handling sizes from 2½ inches down.

In addition to handling sand and gravel and crushed stone, vibrating screens are separating many other materials in the pit and quarry industries including lime, gypsum, marble, slag, phosphate rock, mica, fullers earth, etc. The vibrating screen commends itself to serious consideration be-

cause of its economy in space, head room, power and maintenance cost. Its capacity and screening efficiency are points to be studied carefully.

Elimination of Grade Crossing Hazards

The elimination of grade crossing hazards was urged this week in a brief filed with the Interstate Commerce Commission by the American Motorists' Association in connection with the commission's hearings on the adequacy of automatic train control. The motoring association urged that there is greater need, at the present time, for safety at grade crossings than there is for automatic block signals or train control devices. Many representatives of the leading railroads have likewise urged upon the commission the necessity for the elimination of the grade crossing hazard.

The grade crossing problem is far more pressing at this time than block signals for automatic train control, both the association and a majority of the railroads have informed the commission. Figures presented to the commission by the motoring association showed that during January, the latest figures available, no railroad passenger was killed in a railroad accident. During the same month, 471 highway grade crossing accidents were reported, with a total of 185 deaths and 529 injuries, of which approximately 80 per cent were automobile-train accidents, the association's figures show.

In January of last year, the railroads reported 499 accidents, resulting in 206 deaths and 604 injuries.

"The enormous increase in motor traffic and the increase of accidents at road crossings have resulted in a major problem to the motorists and the railroads," J. Borton Weeks, president of the association, declares. "The elimination of grade crossings is far more urgent than automatic control of trains. Figures of the commission show that from 10 to 20 times more fatalities occur at grade crossings than occur as the result of lack of automatic control."

The association cited figures from reports of numerous railroads, showing that in recent years the bulk of all accidents have been at grade crossings. As a fair example, figures of a mid-western line, operating 900 miles of track, are cited, showing that it had but six fatalities in connection with train operations during the past three years, while during the same period, 77 persons were killed at grade crossings on the same line.

Phosphorus and Cement

Phosphorus and an aluminous cement are obtained by melting phosphates, under reducing conditions, in an electric or a shaft furnace with a slag formed by fusing, under reducing conditions, 70-90 parts of alumina with 30-10 parts of lime. Bauxites of high iron content may be employed in forming the slag, the iron being eliminated in the fusion in the form of a regulus. I. G. Farb. Ind. A. G. (British Patent 287, 036).

Rotary Cement Kiln

A rotary cement kiln is equipped with a cooling chamber for the clinker consisting of a rotating drum, *C*, Figure 6, properly insulated and fitted with means to disintegrate the clinker. A cooling air current passes through this chamber and takes up the maximum possible heat before passing to the kiln proper, so that the cooling drum for the clinker serves also as a pre-heater for the combustion air of the kiln *A*. The chamber *f*, serves to grind the disintegrated clinker to fine grains. Ernst Krüittel (German Patent Application 99, 767).

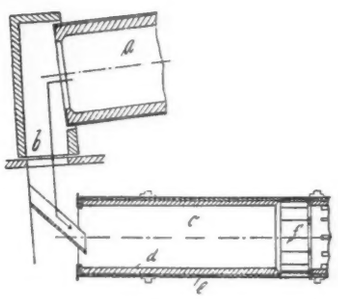


Fig. 6

Causes of Concrete Destruction

The compounds having the greatest destructive effect on concrete in gas works are sulphur dioxide, carbon dioxide, sulphates and ammonium salts. In contact with Portland cement, sulphur compounds in a gaseous form or in solution react with free lime, and eventually convert it into calcium sulphate, the crystallization of which causes the concrete mass to swell and crack; with reinforced concrete the cracks permit corrosion of the steel. Water containing soluble sulphates reacts with the calcium aluminate to form calcium sulpho aluminate which has an even greater expansion than gypsum. Water saturated with carbon dioxide dissolves the free lime as acid calcium carbonate and renders the cement porous; ammonium salts have a similar action. For gas works and chemical works it is recommended that the concrete used should be made with a cement containing no free lime and rich in alumina; whose composition corresponds to 35-45% CaO, 5-10% SiO_2, 35-55% Al_2O_3, 5-15% Fe_2O_3, and 2-3% TiO_2. With this cement basalt, or a well graded chamotte should be used as ballast. Further protection is afforded by coating the concrete immediately after setting with a waterproofing material. Orthaus (Gas. u. Wasserfach *71*, 145-156, 1928 and B. C. A., May 11, 1928).

INTIMATE NEWS OF MEN AND PLANTS

Two Leading Plants Join

Two of the largest rock and building materials concerns in California have merged their properties under the name of the Consumers Rock and Gravel Company according to announcement made recently. Investment in the two companies is placed at $6,500,000 by their officials. The organizations are the Consumers Rock and Gravel Company and California Materials, Incorporated. Both have been operating in Los Angeles and various sections of Southern California for more than fifteen years. The combined output of the two companies is estimated to exceed 4,000,000 tons of material per year.

Operations of the Consumers Company are centered in the San Fernando Valley around the main crushing plant at Roscoe, and its distributing stations serve a territory extending from Santa Barbara to the Mexican border. The Consumers Company operates seven plants, twenty-three crushers, eleven distributing stations, six batching bunkers, 11.1 miles of its own railroads, sixteen locomotives, fifty railroad cars and employs about 500 men. Consumers also uses Southern Pacific and Pacific Electric for shipments throughout the South.

California Materials, Inc., has concentrated its activities in the San Gabriel Valley surrounding Whittier. It recently completed and placed in operation a large crushing plant at Irwindale, near Baldwin Park, said to be one of the finest in the West. It has a quarry in Sycamore Canyon, a large distributing, storage and warehouse depot at Whittier, and a comprehensive system of railroad yards at the new Irwindale plant, making direct connections with the main lines of the Southern Pacific and Pacific Electric.

A. H. Gregg, president and John D. Gregg, general manager, represented California Materials, Inc., in closing negotiations with the Consumers Rock and Gravel Company, represented by A. J. Ginoux, president; F. F. Gay, vice president; F. J. Gay, secretary, and Frank Gautier general manager.

Kentucky Quarries Merge

The Kentucky Consolidated Stone Company, Heyburn Building, Louisville, Kentucky, was formed recently by the merger of 11 quarries in that state. These quarries produced a large percentage of the crushed stone produced in Kentucky last year and expect to more than double their output this year through increased efficiency and the application of more modern methods. Officers of the new company are: A. J. Hoffman, president; Robert Cox, vice president and general manager; V. A. Morgan, secretary and treasurer; Ernest N. Ripy and Sam Parks Burnam, production managers, and Dunlap Wakefield, chairman of the board of directors.

Properties included in this consolidation are: American Stone Ballast Company, High Bridge; Kentucky River Stone and Sand Company, Tyrone; W. J. Sparks Company, Mt. Vernon; Boggs-Berman Company, Yellow Rock; Lilmay Stone Company, Stephensburg; Goodin, Brown and Company, Upton, and Webster Stone Company, Irvington.

Road Stone

The Pittsburgh Limestone Company of Buffalo Creek, near Kittanning, Pennsylvania, has added the production of road limestone to its other products. Other developments along that line may be made in the future.

Gravel Plant Remodels

The Tractor City Sand and Gravel Company of Janesville, Wis., is remodeling its plant on the Block Bridge road, near the city limits, at a cost of about $25,000.

New Minnesota Quarry

The Quality Granite Company recently began developing two granite quarries of red and gray granite on the Henz farm, 3 miles west of St. Cloud, Minnesota. The property consists of 71 acres, about half of which is red and gray granite ledges. Installation of new equipment was begun May 1st. The new company is capitalized at $50,000 and officers are: Arthur H. Emmel, president; Andrew Hagberg, vice president; Nicholas Stein, treasurer; John M. Emmel, secretary. Mr. Hagberg will be in charge of the development.

To Build New York Quarry

The Cheektowaga Crushed Stone Corporation of Cheektowaga, (Depew P. O.), New York, was recently organized with Mark Kyler of North Tonawanda as president. The new corporation owns property north of Bennet road and east of Union road. A new plant is to be erected at a cost of $50,000 and machinery valued at about the same figure is to be installed.

New Plant for Georgia

It has been announced that the Georgia Portland Cement Corporation has started to erect a cement plant near Sandersville, Georgia. The company operates several plants in the South and this additional plant will not only increase production, but will reduce transportation costs.

Lime and Plaster Companies Effect Merger

A merger of the Pacific Lime and Plaster Company with United States Lime Products Corporation, both of San Francisco, has been announced by Charles M. Cadman, president of the merged companies. The United States Lime Products Corporation has a plant at Sloan, Nevada, and one at Sonora, California. It maintains warehouses in Portland, Los Angeles and San Francisco. The Pacific Lime and Plaster Company had shipped its millionth bag of hydrated lime just prior to the consolidation, according to H. R. Brookman, district sales manager.

U. S. Gypsum Builds New Plants

Ground has been broken for an additional manufacturing plant for the United States Gypsum Company. The site is located on the Mystic River, in Charleston, Massachusetts. Raw gypsum for the plant will be brought from the quarries of the company in Nova Scotia by the three ships recently completed.

Gemmer and Tanner Expands

According to an announcement by John Tanner of the firm of Gemmer and Tanner, with operations at Eagle Lake, Texas, a large expansion program is going on at the gravel pits. The new equipment, which has been purchased and is en route, includes motors, dredge pump, steel barge and the most modern screening, crushing and washing machinery.

United States Gypsum Plans Expansion

The United States Gypsum Company plans to erect new plants in Philadelphia, Chicago and New York, to which gypsum will be shipped from Michigan and Canada. The site of the Philadelphia warehouse and office is on the Schuylkill River at 58th Street. The New York and Chicago sites have not yet been announced.

Illinois Plant Moves

F. W. Benecke of Bloomington, Illinois, has opened a new gravel plant on West Oakland Avenue, one mile west of the former location.

Bauxite in 1927

The production of bauxite in the United States in 1927 was 320,940 long tons, valued at $1,988,780, a decrease of 18 per cent in both quantity and value, as compared with 1926, according to a statement prepared by J. M. Hill, of the United States Bureau of Mines, Department of Commerce.

Production in the eastern fields in 1927 was 17,110 tons, valued at $95,920, a decrease of 17 per cent in quantity and 18 per cent in value, and in Arkansas it was 303,830 tons, valued at $1,892,860, a decrease of 18 per cent in both quantity and value, as compared with 1926. No bauxite was produced in Tennessee in 1927, and the Alabama production was entirely from the Eufaula district, Barbour County, which was opened in 1926.

The sales of domestic bauxite by producers to various consuming industries in the last five years are given in the following table.

Imported bauxite, particularly that from South America, has been of increasing importance to domestic consumers, as shown by the following table.

Exports of bauxite and bauxite concentrates have likewise increased, particularly in the last two years, since the great increase in aluminum manufacture in the Canadian and Norwegian plants of the Aluminum Co. of America.

Bauxite (Including Bauxite Concentrates) Exported from the United States, 1923-1927

Year	Long Tons	Value
1923	78,560	$3,380,486
1924	77,065	3,979,832
1925	78,633	4,134,455
1926	87,770	4,741,260
1927	121,858	7,800,491

The producers of domestic bauxite reported sales during 1927 at prices ranging from $5 to $6.50 a long ton. The average for Arkansas bauxite was $6.23 a ton, for Alabama $6.08, for Georgia $5.46, and for the United States $6.20. It is believed that the values given represent more nearly production costs, as the greater part of the domestic bauxite is produced by consumers of bauxite. The quoted prices for bauxite were as follows: Domestic: No. 1 chemical ore, over 60 per cent Al_2O_3, less than 5 per cent SiO_2 and less than 2 per cent Fe_2O_3, $8 a long ton f. o. b. Georgia mines; foreign: Dalmatian low-silica bauxite $5 to $6.50, Istrian $5.50 to $7, and French red bauxite $6 to $7.50 a metric ton c. l. f. New York.

Bauxite Produced in the United States, 1923-1927

Year	Georgia, Alabama[1] and Tennessee Long Tons	Georgia, Alabama[1] and Tennessee Value[2]	Arkansas Long Tons	Arkansas Value[2]	Total Long Tons	Total Value[2]
1923	28,810	$176,030	493,880	$2,980,580	522,690	$3,156,610
1924	19,940	156,990	327,630	1,981,000	347,570	2,137,990
1925	20,220	109,800	296,320	1,878,450	316,540	1,988,250
1926	20,680	116,650	371,570	2,298,550	392,250	2,415,200
1927	17,110	95,920	303,830	1,892,860	320,940	1,988,780

[1] Production from Alabama in 1924, 1925 and 1926, and no production from Tennessee in 1927.
[2] Value f. o. b. mines.

Domestic Bauxite Sold by Producers to Industries in the United States, 1923-1927, in Long Tons

Year	Aluminum	Chemical	Abrasive	Cement and Refractory	Total
1923	380,520	68,870	72,830	470	522,690
1924	225,780	54,870	66,400	520	347,570
1925	173,040	67,420	73,720	260	314,440
1926	241,850	77,960	72,210	230	392,250
1927	186,490	62,410	71,790	250	320,940

World production of bauxite has likewise been increasing along with the expansion in manufacture of aluminum, the growth of the chemical and abrasive industries, and the expanding demand for aluminous cements.

Supply of Bauxite in the United States, 1923-1927

Year	Domestic Production Long Tons	Domestic Production Value	Imports Long Tons	Imports Value	Total New Supply Long Tons	Total New Supply Value
1923	522,690	$3,156,610	119,020	$ 593,882	641,710	$3,750,492
1924	347,570	2,137,990	201,974	909,493	549,544	3,047,483
1925	316,540	1,988,250	353,696	1,549,120	670,236	3,537,370
1926	392,250	2,415,200	281,644	1,187,497	673,894	3,602,697
1927	320,940	1,988,780	356,580	1,572,236	677,520	3,561,016

Fuller's Earth in 1927

The fuller's earth sold or used by producers in the United States in 1927 amounted to 264,478 short tons, valued at $3,767,038, it is announced by the United States Bureau of Mines, Department of Commerce, which has collected statistics in cooperation with the Geological Surveys of Florida, Georgia, Illinois, and Texas. This is an increase of 13 per cent in quantity and 12 in value compared with 1926. Every important producing State except Illinois and Texas showed an increase. The output was reported by 16 operators in 7 States in 1927, namely, Arizona, Florida, Georgia, Illinois, Massachusetts, Nevada, and Texas. Georgia was the leading State in production in 1927, with Florida second and Nevada third. These three States produced 79 per cent of the total output. The average value per ton of fuller's earth was $14.24 in 1927 compared with $14.33 in 1926.

Fuller's earth is a term used to include a variety of natural substances that possess the property of absorbing grease or clarifying, bleaching or filtering oil. They are mostly clay-like substances, though recently discovered material in the West, which is of different character, is said to be superior to the eastern fuller's earth. The original use of fuller's earth was in the fulling of cloth, but little of it is now used for this purpose. It is used almost exclusively in the bleaching or filtering of vegetable and mineral oils.

Until 1895, when fuller's earth was successfully produced commercially in Florida, the United States was entirely dependent on foreign supplies. In 1927 the imports of fuller's earth were 7,580 short tons, valued at $109,281, a decrease of 17 per cent in quantity and 12 per cent in value compared with 1926.

The exports of fuller's earth are not separately shown in the official records of the foreign commerce of the United States but 6 producers reported to the Bureau of Mines that in 1927 they exported 12,287 short tons of fuller's earth, which was an increase of 85 per cent over 1926.

Avery to Open Quarry

Avery and Company has recently moved its equipment from the Adams Quarry. It will be installed in the new quarry which is being developed at Clarksburg, Indiana.

Greenville Gravel Reorganizes

Owing to the expansion of the Greenville Gravel Corporation, which operates 22 plants, produced 144,000 cars of sand and gravel in 1927 and builds machinery for the sand and gravel industry, it was deemed advisable to reorganize and place the business on a sound financial basis. The name of the corporation has been changed to the American Aggregates Corporation to designate the enlarged scope of the organization and it has placed with New York bankers $2,000,000 in 6 per cent 15 year debentures.

Mica in 1927

The total quantity of uncut mica sold by producers in the United States in 1927, as reported by the United States Bureau of Mines, Department of Commerce, was 7,036 short tons, valued at $322,621. Of this quantity 756 tons (1,512,492 pounds), valued at $212,482, was sheet mica; the rest was scrap mica.

The production was made by 11 States: North Carolina, New Hampshire, South Dakota, New Mexico, Virginia, Connecticut, Colorado, Maine, Georgia, Alabama, and Nevada. Figures for Alabama, Georgia, North Carolina, and Virginia were collected in cooperation with the respective State Geological Surveys.

Domestic Uncut Mica Sold by Producers in the United States in 1926 and 1927

	Sheet Mica		Scrap Mica	
	Pounds	Value	Short Tons	Value
North Carolina:				
1926	700,313	$150,362	2,880	$54,048
1927	665,360	114,514	2,995	50,505
New Hampshire:				
1926	1,371,890	235,890	1,738	38,213
1927	720,219	78,849	1,284	22,909
Other States:*				
1926	53,852	8,108	1,437	27,699
1927	126,913	19,119	2,001	36,725

*Alabama, Colorado, Connecticut, Georgia, Maine, Nevada, New Mexico, South Carolina, South Dakota, and Virginia.

The total sales of uncut sheet mica in 1927 showed a decrease of 30 per cent in quantity and 47 per cent in value, as compared with 1926. The total scrap mica sold showed a decrease of 11 per cent in quantity and 19 per cent in value, as compared with 1926.

The sales of uncut sheet mica in North Carolina showed a decrease of 5 per cent in quantity and 24 per cent in value. New Hampshire showed corresponding decreases of 48 per cent in quantity and 67 per cent in value.

The average value per pound of all sheet mica sold in the United States in 1927 was about 14 cents, as compared with 18 cents in 1926, and the average value of scrap mica a short ton was about $18 in 1927, as compared with $19 a ton in 1926.

The imports of mica for consumption were 3,459,647 pounds, valued at $1,630,309. Corresponding figures for 1926 were 6,318,096 pounds, valued at $2,450,834.

New Incorporations

Lucasville Sand & Gravel Co., Lucasville, Ohio. $30,000. Kinney M. Long, Louis M. Day, Daniel H. Harwood, Mable Candill.

Cheektowaga Crushed Stone Corp., Cheektowaga, Depew P. O., N. Y. $250,000. Mark Kyler, Pres., North Tonawanda, N. Y. Will build crushed stone plant.

Franklin Sand & Cement Products Co., Ridgewood, Brooklyn, N. Y. $125,000.

Pioneer Sand Co., 1117 Juliana St., Parkersburg, W. Va. 500 shares, $100 each; 1,000 shares, n.p.v. W. E. Shivers, Pres. & Gen. Mgr.; Robert H. Renshaw, Jr., S. D. Archbold, A. L. Shivers, James S. McCluer.

Quality Granite Co., St. Cloud, Minn. $50,000. Will open two granite quarries on State Highway. Arthur M. Emmel, Pres.; Andrew Hagberg, V. P.; Nicholas Stein, Treas.; John M. Emmel, Sec.

Vienna Sand & Gravel Co., Hawthorne, N. J. Harry A. Bysterbusch, Garrit Bysterbusch, Hawthorne; Wm. Youngster, Anna M. Youngster, Totowa, N. J.

White Rock Silica Co., Browntown, Wis. $50,000. Dr. Robert Wehann, Pres., Rockford, Ill. John Carroll, W. J. Newman, care W. J. Newman Co., 21 N. Curtis St., Chicago, Ill. Now building plant at Browntown.

Eugene Sand & Gravel Co., Salem, Ore. $100,000. H. B. Ruth, J. R. McKay, H. Platt.

M. S. & B. Sand & Gravel Co, Wallington, Hainesburg P. O., N. J. $100,000. Clifton Bloom, Max O. Bloom, John Stock, Wallington; Jacob Miller, Rutherford, N. J.

Limestone Service Co., Centerville, O. 250 shares, n.p.v. W. C. Burns, Edward W. Ellis, L. A. Elliott.

Rotary Stone Co., Memphis, Tenn. $25,000. W. F. Spilbigs, A. H. Zimmerman.

Ebert Washed Sand & Gravel Co., Washington, Ill. $25,000. M. Ebert, G. W. Ebert, Frank L. Blumenshine.

Southern Quarries Corp., care Parham & Lassiter, Oxford, N. C. 100,000 shares. To operate stone quarries.

Arrowhead Sand & Gravel Co., Plattin, Mo. Wm. P. Carmichael, 802 Rialto Bldg., St. Louis, Mo. (Same ownership as Carmichael-Cryder Co.)

State Sand & Gravel Co., 2161 Boulevard Place, Indianapolis, Ind. Henry M. Huff, Indianapolis; Richard H. Kelly, Roy A. Kelly, Bloomington, Ind. $75,000.

Stone Sand & Gravel Co., 1203 Vernon Drive, Dayton, Ohio. 250 shares n.p.v. Morris Stone, Mary Stone, Alexander Rowinsky.

Limestone Calcium Products Co., Limestone, Rocky Ridge P. O., Ohio. A. S. Deringer, William Lipstraw, William Weller. 250 shares n.p.v.

Florida Lime Products Co., Marianna, Fla. 100,000 shares n.p.v. J. C. Corcoran, C. A. Robinson, D. P. Daniel.

A. and K. Builders' Supplies, Inc., Jamestown, N. Y. Sand and gravel. 2,000 shares n.p.v. Alvin M. Anderson, Allen E. Bargar.

Riverside Cement Co., Los Angeles, Calif. (Reorganization of Riverside Portland Cement Co.) 710,000 shares n.p.v.

Arrowhead Sand & Gravel Co., Plattin, Mo. Wm. P. Carmichael, 21 Thornby Road, St. Louis, Mo.

State Sand & Gravel Co., Indianapolis, Ind. Henry M. Huff, Richard H. Kelly, Roy A. Kelly. $75,000.

Stone Sand & Gravel Co., Morris Stone, Dayton, Ohio. 250 shares n.p.v.

Southern Quarries Corp., care of Corp. Trust Co. of America, Wilmington, Del. 100,000 shares.

Seaford Sand & Gravel Corp., Seaford, N. Y. $12,000.

New Texas Potash Plant

The newly organized American Potash Company, of Texas, plans to sink a potash shaft on its holdings 10 miles south of Odessa, Texas, according to Max Agress, president of the company. Plans also call for the construction of a first class refinery with a capacity of 2,000 tons daily, all improvements to call for an expenditure of about $2,000,000. J. L. Lancaster, president of the T. and P. Railroad, is one of the incorporators.

New North Carolina Plant

The Carolina Cement Company, New Bern, North Carolina, recently formed by J. A. Acker of Port Huron, Michigan, plans to build a cement mill and plant on property acquired there some time ago. The plant will have a capacity of 4,000 barrels of cement per day and will cost about $2,000,000.

Start California Quarry

A. S. Hathaway and his son, H. H. Hathaway, have set up a limestone crushing mill on their ranch near Yreka, California. The lime produced is to be used as fertilizer for surrounding farms.

Bedford-Bloomington Limestone During 1927

The sales of stone for construction from the quarries of the Bedford-Bloomington oolitic limestone district, Lawrence and Monroe Counties, Indiana, in 1927, as reported to the United States Bureau of Mines, Department of Commerce, by the producers, amounted to 13,572,950 cubic feet, valued at $16,407,170. This was a decrease of 4 per cent in quantity compared with 1926. These figures include 5,445,970 cubic feet of rough blocks, valued at $3,461,369; 5,268,060 cubic feet of sawed and semi-finished stone, valued at $4,685,844, and 2,858,920 cubic feet of cut stone, valued at $8,259,957.

Besides the high grade stone quarried chiefly for construction, considerable stone (amounting to 423,320 tons, valued at $381,455, in 1927) used for concrete, road metal, flux, riprap, rubble, glass making, agriculture, etc., is produced in these counties. This grade of stone showed an increase of 4 per cent in quantity over 1926.

Stone sold by quarry operators to the finishing mills of the district and dressed and resold by them in 1927 amounted to 1,670,470 cubic feet, valued at $3,646,445, an increase of 11 per cent in quantity over 1926. The total sales by these plants included sawed stone, 728,000 cubic feet, valued at $704,732; semi-finished stone, 35,030 cubic feet, valued at $58,056; cut stone, 907,440 cubic feet, valued at $2,883,657, and represent a considerable increase in sawed stone, a small increase in semi-finished stone, and a decrease in cut stone.

The accompanying tables show the output of the district for the quarries and finishing mills, for 1926 and 1927, by classes of stone:

Re-Open New York Quarry

William F. Borrman has begun operation of a limestone quarry on his farm 2 miles north of Norwood, New York. Equipment is being installed to quarry and crush the stone, which is a hard blue limestone. In the future, by-products may be used for the manufacture of lime plaster, land plaster, brick material and wallboard filler.

New Arkansas Granite Quarry

The Frisco Quarried Stone Company, of which Tom B. Laird is head, is opening a granite quarry one mile east of Bona, Arkansas. Installation of equipment and construction of 1½ miles of spur track will be begun in the near future.

Celite Products Expands

The Celite Products Company, 1320 South Hope Street, Los Angeles, California, is planning extensions and improvements in the plant of the National Magnesia Company at Redwood City, recently acquired. New buildings are to be constructed and machinery for mining raw materials and refining will be installed at an approximate cost of $200,000.

Cement Merger Ratified

Stockholders of the Pennsylvania Dixie Cement Corporation have ratified the merger of their concern with the North American Cement Company. Stockholders of the North American had approved the merger May 1st. The General Cement Corporation, which is the name of the new concern, has acquired all the property assets and business of the two large merged companies. John A. Miller, formerly president of the Penn-Dixie, is chairman of the board of the corporation and Frederick J. Kelly, formerly president of the North American, is president.

New Utah Salt Refinery

The Royal Crystal Salt Company, of Salt Lake City, Utah, care of I. A. Clayton, Jr., 201 Regent Building, plans to build a new refinery on a tract of salt deposits about 12 miles from that city, at a cost of approximately $400,000.

New Cement Site Purchased

The Oklahoma Portland Cement Company of Oklahoma City, Oklahoma, of which N. O. Mathews is manager has purchased 100 acres of land near Saratoga, Arkansas. It is announced that the company is planning the construction of a new mill to cost in excess of $600,000.

New Texas Gravel Pit

Sheriff H. L. Johnson of Slaton, Texas, has installed machinery for loading and digging gravel on his ranch six miles northwest of that city. Production has been going on for several weeks and the output has increased steadily.

Alabama Lime Plant Sold

The Lehigh Portland Cement Company of Allentown, Pa., recently purchased the Lagarde Lime and Stone Company of Lagarde (Glencoe P. O.), Alabama.

Calaveras Cement Appoints

The Calaveras Cement Company of San Francisco, California, recently appointed William Macnider as assistant general manager. H. C. Maginn was appointed sales manager, succeeding Mr. Macnider, and will be in charge of sales and distribution.

New California Cement Plant

The Los Angeles Mountain Park Company is planning to establish a 2,500 barrel a day cement plant, rock crusher, and pipe, brick and other plants on their property in the Westgate area of Los Angeles, California. Granting of the permit for the plant, which will cost about $2,000,000, is now being considered by the city council.

New Arkansas Plant

The Big Rock Stone and Material Company, Little Rock, Arkansas, of which Ben F. Dickinson is secretary, is erecting a $20,000 mixing plant.

Limestone Sold by Producers in the Bedford-Bloomington District, Lawrence and Monroe Counties, Ind., 1926 and 1927, by Classes

Class	1926 Quantity	1926 Value	1927 Quantity	1927 Value
Construction:				
Rough blocks..cubic feet	5,747,510	$ 3,510,665	5,445,970	$ 3,461,369
Sawed ..... do.	4,982,780	4,654,126	5,268,060	4,685,844
Semi-finished .. do.	513,460	1,047,692	(*)	(*)
Cut ..... do.	2,927,740	8,850,665	2,858,920	8,259,957
Total Const.. do.	14,171,490	$18,063,148	13,572,950	$16,407,170
Other stone ....short tons	405,630	354,703	423,320	381,455
Grand total (quantities approximate) in short tons	1,432,480	$18,417,851	1,407,360	$16,788,625

*Semi-finished stone included under sawed stone.

Indiana Oolitic Limestone Sold by Mills Not Operated by Quarry Companies in the Bedford-Bloomington District, Lawrence and Monroe Counties, Ind., 1926 and 1927, by Classes*

Year	Sawed Cubic Feet	Sawed Value	Semi-finished Cubic Feet	Semi-finished Value	Cut Cubic Feet	Cut Value	Total Cubic Feet	Total Value
1926	†402,250	†$414,416	(†)	(†)	1,109,000	$3,658,855	1,511,250	$4,073,271
1927	728,000	704,732	35,030	$58,056	907,440	2,883,657	1,670,470	3,646,445

*Includes some stone purchased by quarry operators and milled and resold.
†Semifinished stone included under sawed stone.

NEWS OF EQUIPMENT MANUFACTURERS

New Diesel Described

F. Van Rosen Hoogendyk of New York city is distributing a six page illustrated bulletin which describes the Colo-Diesel engine, manufactured by the Colo-Diesel Motor Company of Munich, Germany. It is described as a small airless injection engine of highest economy, greatest reliability and utmost efficiency, which is always ready to start and consumes all kinds of heavy oil including gas, crude, paraffin or tar oil. It has no carbureter, no magneto and no compressor. The principal characteristics claimed are, low consumption of cheap fuels, simplicity of design, unfailing reliability, sturdy construction, moderate size and no fire risk.

Cincinnati Car Appoints H. R. Sykes

The Cincinnati Car Company announces the appointment of H. R. Sykes as sales manager of the locomotive division. He will have charge of the distribution of the Cincinnati type of Diesel, gasoline, and electric locomotive.

Asbesgraphite for Brakes and Friction Blocks

Thomas L. Gatke, Chicago, is distributing a four page illustrated folder which describes the uses of asbesgraphite blocks and frictions and Ektag, the Gatke folded and compressed brake lining. These materials are said to be self lubricated, nonscoring, of asbestos composition which are not affected by moisture and will not absorb oil.

New G. E. Director

Henry C. McEldowney, president of the Union Savings Bank and the Union Trust Company, of Pittsburgh, was elected a director of the General Electric Company at an organization meeting of the board held in Schenectady May 8. Gerard Swope, president, other directors, and all other officers of the company, were re-elected.

New Mundy Distributors

The Mundy Sales Corporation of New York City, distributors for the J. S. Mundy Hoisting Engine Company, announces the appointment of new exclusive distributors for the Mundy line of hoisting equipment, the Dobbie line of steel derricks, rotating derricks and hammerhead and gantry cranes, and the Schofield-Bursett excavator. The E. F. Craven Company, Greensboro, North Carolina—eastern North Carolina. The Lone Star Road Machinery Company, Dallas, Texas—northeastern Texas. The R. P. Swenny Company, Greenville, South Carolina—entire state of South Carolina. The Nixon-Hasselle Company, Chattanooga, Tennessee—eastern Tennessee.

B. A. Ford Sales Manager of Valve Bag Co.

Burton A. Ford, formerly secretary and general manager of the National Lime Association, is now associated with the Valve Bag Company, Toledo, Ohio, as sales manager.

Gasoline Operated Cranes

The Orton Crane and Shovel Company, Chicago, Illinois, is distributing its 16 page illustrated bulletin, 56, which describes gasoline operated locomotive cranes. The advantages of using internal combustion engines on locomotive cranes are given, among which saving in time, labor, maintenance and fuel are discussed, together with their dependability and cleanliness. The principal features are described as, a large range of capacities, from 4 to 40 tons; composition and design of car body; riveted and welded turntable; roller bearing swing; worm wheel boom hoist; air brakes; roomy, all steel cab; and a compact operating mechanism with the operating levers in one bank.

Midwest In New Hands

The Midwest Locomotive Works, Cincinnati, Ohio, has been taken over by the owners of The Columbia Machine Tool Company and The Ceramic Machinery Company and has recently been moved to Hamilton, Ohio, where locomotives from 3-tons to 15-tons capacity will be manufactured from designs heretofore built in Cincinnati. Larger sizes will be added to the line at an early date.

Midwest gasoline gear drive industrial locomotives enjoy an enviable reputation as being simple in design, rugged in construction and efficient in operation, including a minimum upkeep. Repairs for the Burton friction drive locomotives formerly built by The Burton Company, the predecessor of the old Midwest Locomotive Works will be furnished as heretofore.

The key men occupying the following positions with the old company are going with the new organization. J. C. Meyers, purchasing agent and office manager; Ray Doll, shop superintendent, and George Marsh, foreman.

The locomotive business will be operated as a division of The Columbia Machine Tool Company and The Ceramic Machinery Company. Necessary equipment and space is available for present needs for economically building locomotives. The Ceramic Machinery Company has been in business over twenty years and the Columbia Machine Tool Company over ten years, and the combined net assets of these two companies is something over $650,000.

Waukesha Promotes

H. J. Loebl has been appointed assistant in the service department of the Waukesha Motor Company, Waukesha, Wisconsin. Mr. Loebl was for a number of years in the service department of the Sterling Motor Truck Company. W. C. Kiefer, who was formerly in the automotive service department of the Buda Company, is now in charge of field service activities for the Waukesha Motor Company.

Thew Dependability

The Thew Shovel Company of Lorain, Ohio, is distributing an illustrated bulletin which emphasizes the dependability and long-wearing qualities of the Thew center drive truck and the Lorain 60 and 75 shovels, cranes, draglines and backdiggers.

Magnetic Manufacturing Appoints Agents

The Magnetic Manufacturing Company of Milwaukee, Wisconsin, recently appointed J. H. Phinney as exclusive representative for the eastern part of Michigan on its line of magnetic separators, magnetic clutches and other equipment. Mr. Phinney's headquarters will be in the United States Mortgage Building, Detroit.

Foote Brothers Appoint Representatives

The Foote Brothers Gear & Machine Company of Chicago, Ill., recently appointed Woodbury and Wheeler, 55 Second Street, Portland, Oregon, as representatives in that vicinity. The Cunningham Electric Company, 2123 Pacific Ave., Tacoma, Washington, was appointed as representatives in Tacoma and vicinity.

New Bucyrus Erie Shovel

The Bucyrus-Erie Company of Erie, Pennsylvania, has recently put into quantity production the Type "1030" ¾ yard gas shovel and crane. The outstanding feature is a 72½ horse power motor which allows a faster swing and hoist through the use of larger hoist drums. To take care of the greater speed, oversize outside contracting band clutches are used, with a large contracting shoe type brake to stop the swing. To prevent any chance of the gears working apart and springing the shaft they are tied together and held in perfect alignment by a steel box housing, completely enclosed, and running in oil.

The drum shaft is 5½ inches in diameter, the swing clutch shaft 3⅝ inches, and other parts in proportion all through the machine. The truck frame is a one-piece steel casting, and the revolving turntable is of the same construction, providing a rigid base for the operating machinery. Every running shaft above deck which operates when the machine is digging is equipped with self-aligning ball bearings and perfect alignment is insured by the use of only two bearings on each shaft.

All high speed gears are enclosed and run in oil, reducing the oiling to checking up the oil level every week or so. The control levers are conveniently located and auxiliary clutches set the large clutches entirely by power. There is a clear passage all around the machinery and all parts are accessible without removing any other part. The weight of the machinery is placed entirely to the rear of the center-pin giving more stability for heavy lifting and hard digging. The mounting is the latest development of the Bucyrus-Erie caterpillar type "Single shaft drive" and is controlled from the driver's seat.

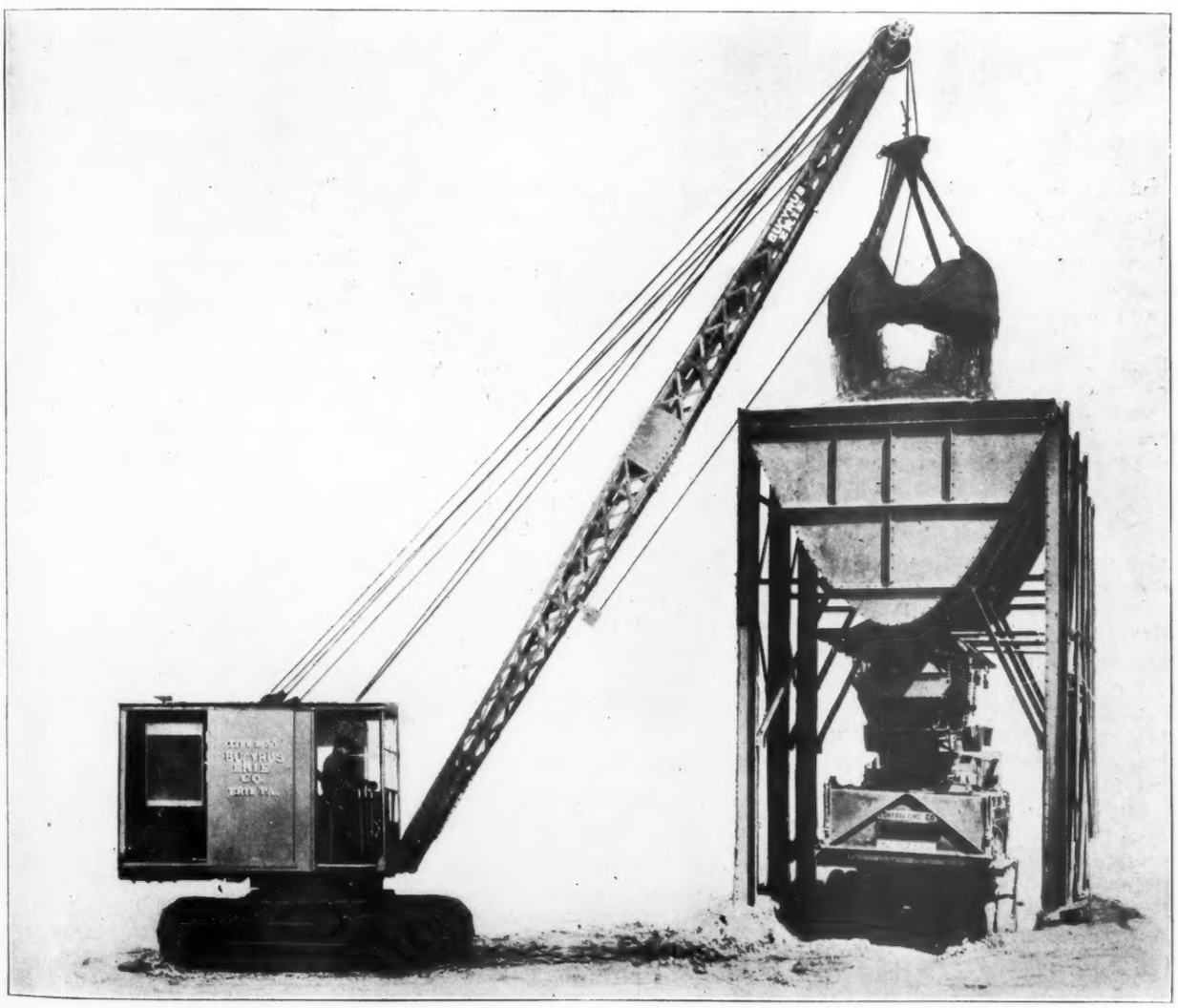
Either sharp or gradual turns can be made with this mounting which has only one drive shaft and one gear and pinion below deck, completely housed and running in oil. A 2 way brake locks the machine in either direction while permitting free travel the other way, a valuable feature for a dragline or when working on a grade.

Telsmith Moves Chicago Office

Smith Engineering Works of Milwaukee, Wisconsin, has moved the Chicago office from the Old Colony Building to the Builders Building, La Salle Street and Wacker Drive. Victor Jones is in charge of the Chicago office.

General Electric Promotes Charles E. Tullar

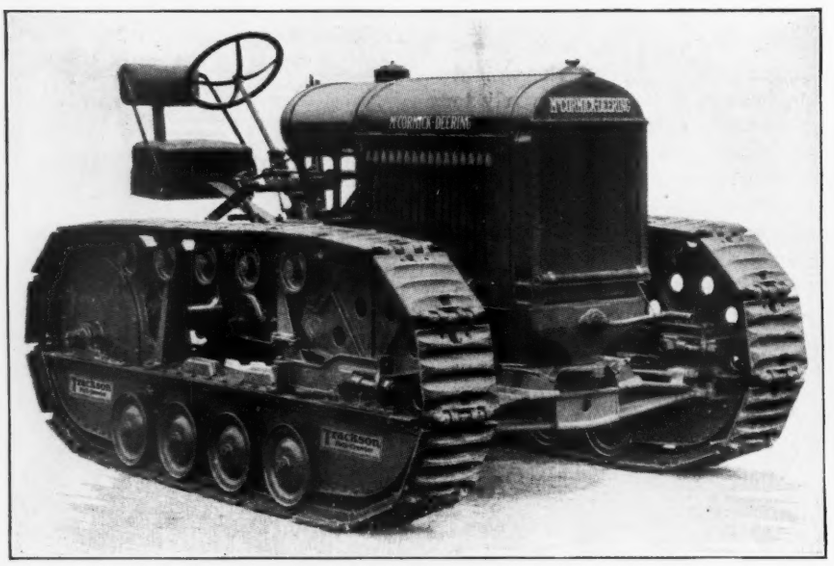
Charles E. Tullar has been appointed manager of the patent department of the General Electric Company to succeed the late A. D. Lunt. Mr. Tullar has been assistant manager of the department since December 12, 1927.



New Bucyrus Erie Shovel

A New Tractor Unit

The International Harvester Company and the Trackson Company have combined the Trackson Full-Crawler with the McCormick-Deering 10-20 Industrial Tractor to produce a new 3½ ton tractor unit combining the advantages of both. Dimensions are: Overall length, 118 inches; width, 72 inches; height, 64 inches; center to center tracks, 60 inches, and ground clearance, 9 inches. Speeds are approximately one-third of the standard McCormick-Deering Industrial wheel tractor speeds. The power take-off can be used without interfering with the crawler.



The New Tractor Unit

Tracks are heat-treated alloy steel castings 12 inches wide, with corrugated tread, self-aligning on sprockets and of non-clogging design. Manganese steel tracks, special alloy steel tracks with rubber pads, and grouters for the track shoes are also made for special conditions. Truck frames are of heavy pressed steel with reinforcing angles and steel castings riveted in place. The spacing axle is of heat-treated alloy steel and the truck wheels are fitted on tapered ends of hardened and ground alloy steel shafts and equipped with dirt-proof, ring-oiling bearings. Brake drum diameter is 16 inches and the brakes, controlled through the regular steering handwheel, have hydraulic compressed, copper inserted, asbestos linings. All bolt connections have special lock nuts to prevent loosening. The traction surface in contact with grounds is 1647 square inches and the ground pressure is less than 4½ pounds per square inch.

A New Protective Cream

A protective hand cream has been developed by the research laboratories of the General Electric Company and put on the market. It is furnished as a safety measure to men in the company's plants whose arms are exposed to oil, grease, dirt, varnish, or any other cause of skin irritation. It is applied before beginning work and forms a protective film which dries quickly and is not slippery. Subsequent washing in warm water removes the film and with it any dirt or stains.

Speeder Describes Shovel

The Speeder Machinery Corporation of Cedar Rapids, Iowa, is distributing a 16 page illustrated catalog describing the model B-2 ½ yard self-contained, crawler type, full revolving excavator with direct cable crowd, and the Speeder two wheel trailer to be used for rapid transportation of the shovel.

A Portable Floodlight

The Oxweld Acetylene Company of New York, N. Y., in a 16 page illustrated booklet describes the different types of portable floodlights of its manufacture. Detailed specifications of each model are given as well as a number of illustrations showing the lights being used for various kinds of work.

A Unit Coal Pulverizer

The Hardinge Company of York, Pennsylvania, is distributing a leaflet which carries a line drawing of its unit coal pulverizer. It was developed to combine the characteristics of the conical mill with a system of control that permits the rate of coal fed to the burner to be varied instantly from maximum to minimum. The leaflet refers to bulletin number 27 which describes the unit coal pulverizer.

Recording Pressure Gauges

The Bristol Company, Waterbury, Connecticut, is distributing its illustrated 32 page catalog 1800 on recording liquid level gauges. Included are the April, 1928 price lists and a four page illustrated bulletin on Bristol counters. The illustrations include photographs of installations, charts showing the work accomplished by this particular type of gauge and a number of tables of useful data on the theory and practice of pressure recording and what it means in cost to the average plant.

D. W. Wilson Elected

D. W. Wilson was recently elected vice president and general manager of the Dry Quenching Equipment Corporation according to an announcement by H. D. Savage, president. Mr. Wilson was previously connected with the Wilputte Coke Oven Corporation and the Iroquois Gas Corporation, and was also assistant professor of Chemical Engineering at the Massachusetts Institute of Technology.

Controlling Crusher Wastes

The Ludlow, Saylor Wire Company of St. Louis is distributing a 20 page illustrated bulletin which is termed Section 1 of a "Summary of America's Latest Experience in Screening Practice and Screen Control of Process Operations." A number of illustrations are given of operating plants, flow sheets and useful data in the design of screens. It is pointed out, that with this type of screen, power wastes from useless conveying and recrushing are eliminated; excessive fires and dust from useless cleavages are avoided; and all crushers run at full capacity when full capacity is most needed.

A Speedy Belt Lacer

The Clipper Belt Lacer Company of Grand Rapids, Michigan, in a 30 page illustrated catalog describes the Clipper belt hooks, connecting pins and the various models of belt lacers, one of which, it is claimed, will lace an 8 inch belt in 1½ minutes. A discussion of different types of belt lacing and stresses to which they are subjected is included.

Wire Rope Discussed

The A. Leschen and Sons Rope Company of St. Louis, Missouri, in a six page booklet describes its "Hercules" brand of wire rope. A brief discussion of the respective merits of acid and basic steel wire is included.